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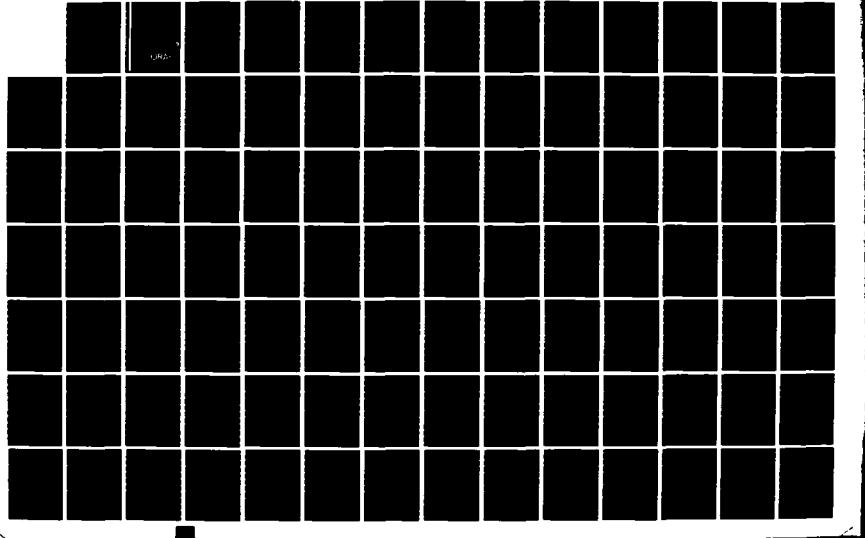

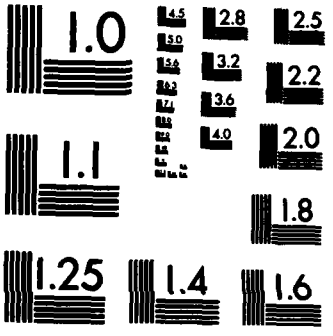

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THE SOVIET-WEST EUROPEAN ENERGY RELATIONSHIP: IMPLICATIONS OF THE SHIFT FROM OIL TO GAS

by
J.B. Hannigan
C.H. McMillan

ORAE-EXTRA-MURAL PAPER NO. 24

OPERATIONAL RESEARCH AND ANALYSIS ESTABLISHMENT
DEPARTMENT OF NATIONAL DEFENCE

OTTAWA, CANADA

JUNE 1983

DEPARTMENT OF NATIONAL DEFENCE

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FOREWORD

The following report is the latest in a series of "Studies in the Soviet Union's International Energy Relations", prepared by researchers at the Institute of Soviet and East European Studies at Carleton University. Professor McMillan is a former director of the Institute; at the time of preparation of this report, Mr. Hannigan was a research associate of the Institute's East-West Project. ORAE regards this report as important and timely, and is therefore distributing it in the series of Extra-Mural Papers for the benefit of its regular readership.

ABSTRACT

This report analyzes, in historical perspective, Soviet oil and gas exports to Western Europe, and attempts to explain the underlying economic motivations for those exports. The increasing importance of oil and gas in total Soviet hard currency earnings is studied from the viewpoint of Soviet dependence on the energy markets of Western Europe. The report also offers projections up to 1990 on the volume and value of Soviet oil and gas exports to hard currency markets. These projections form the basis of a concluding analysis of the effect on the Soviet balance of payments of the shift from oil to gas in the structure of hard currency energy exports.

RESUME

Ce rapport examine d'une perspective historique les exportations soviétiques de pétrole et de gaz naturel vers l'Europe occidentale, et les facteurs économiques les stimulant. L'importance croissante de la part du pétrole et du gaz dans les revenus soviétiques de devises étrangères est étudiée du point de vue de la dépendance de l'URSS sur les marchés de l'énergie occidentaux. Cette étude projette jusqu'en 1990 le volume et la valeur des exportations d'hydrocarbures de l'Union Soviétique, destinées à gagner des devises convertibles. Ces projections sont à la base d'une analyse finale de l'effet sur la balance des paiements soviétique de la transformation qui s'effectue à l'heure actuelle dans la structure des exportations d'énergie,en faveur du gaz, mais au détriment du pétrole.

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I. INTRODUCTION: THE ISSUE

The controversy over western involvement in the new Soviet export pipeline (which is significantly to increase flows of Siberian natural gas to markets in western Europe beginning in 1984) has rallied attention on energy as a factor in Soviet-West European relations. Soviet energy exports to West European consumers have expanded greatly over the past two decades. Since the mid-1970s, however, a significant change in the structure of these exports has emerged, with natural gas becoming increasingly important in Soviet energy exports.

This study focuses on this structural shift - on its origins and on its implications for the future of Soviet-West European economic relations. The issues are complex and controversial, involving technological and financial, as well as commercial, relations. We hope to contribute to their understanding through a careful examination of the historical development of Soviet energy export policy and behaviour. We feel that examination of Soviet policy objectives and their pursuit over the longer-term is essential to any current assessment of the Soviet-West European energy relationship.

The principal findings of the study are summarized in Part II. In Part III, the study traces the longer, post-war history of Soviet oil relations with Western Europe. While the Soviet-West European gas relationship examined in Part IV is of shorter duration, it is more complex in nature, involving large-scale, long-term contractual arrangements linking western equipment, technology and credits to gas supply purchase commitments. The issues involved are exemplified

in the Siberian-west European gas pipeline project, which is summarized in a separate section. The implications of the shift from oil to gas are drawn in a concluding section (Part V).

Research on these subjects is impeded by certain data problems of which the reader should be aware. In brief, the Soviet Union has ceased publishing statistics on the volume and structure of its oil and gas exports, and these must therefore be compiled from western sources which is indirect and slow. Moreover, Soviet sales of oil and oil products are conducted with relative anonymity on western markets, so that many of the details of Soviet export behaviour remain obscure. Finally, while the contracts through which the USSR has sought to increase its exports of gas have attracted a great deal of publicity, many of the specifics remain hidden behind a veil of commercial secrecy.

II. SUMMARY OF PRINCIPAL FINDINGS

1. The contribution of exports of hydrocarbon fuels (oil, oil products and natural gas) to Soviet hard currency earnings in trade with the industrialized West rose from 21 percent in 1970 to 68 percent in 1980, and 75 percent in 1981 according to official Soviet statistics. Almost all of these earnings (in the case of gas, 100 percent) derived from exports to Western Europe. This study documents the growth of Soviet dependence on these exports in its balance of trade with the West.

2. The expansion of Soviet oil exports to Western Europe in the postwar period dates from the mid-1950s. It was launched by the exploitation of major new fields in the Volga-Urals region (the "Second Baku") and boosted by the discovery of giant fields in Western Siberia. The volume of Soviet oil exports to Western Europe increased by 350 percent between 1960 and 1980.

3. It was, however, price increases which especially contributed to the growing share of oil in Soviet hard currency export revenues. The price factor was particularly important after 1973, when the USSR benefited from successive rounds of OPEC price increases, although not a member of the organization. By 1980, the value of Soviet oil exports to Western Europe was fifty-three times greater than in 1960.

4. The increase in the value of oil exports to Western Europe was also due to a change in their structure. The share of oil products exports rose, as Soviet refinery capacity expanded; and as hard currency revenues from crude-oil processing increased, the value added in exports grew.

5. The importance of hard currency revenues from oil exports was revealed in Soviet responses to changing domestic and international conditions. Our analysis revealed considerable evidence in support of the hypothesis that Soviet export policy is directed to the maintenance of a targeted value of hard currency revenues. Hence price rises have been accompanied by decreases (at least in the growth) of the volume of oil exports. Conversely, the softening of prices has witnessed attempts to expand export volume.

6. A corollary to this hypothesis was found in terms of oil export structure. Soviet policy has sought to increase oil product exports over time, while employing crude oil exports as the policy variable through which to pursue hard currency revenue targets. Products exports are typically more profitable than crude oil exports, while the latter can be more easily varied to meet short-term policy objectives.

7. Although the share of oil in Soviet exports has increased, the Soviet share of the west European market for oil imports has remained at about 4-6 percent since 1960. Soviet oil exports to Western Europe are fairly concentrated, with three countries (the FRG, France and

Italy) accounting for 45 percent in 1979. For even these principal customers, however, Soviet oil represented only some 5-7 percent of total oil imports.

8. Several countries for whom Soviet oil constituted a substantially higher share of imports (Iceland, Austria, Switzerland) imported in quantities which would not be difficult to replace on world markets. Hence their actual import dependence on Soviet oil is less than their apparent dependence.

9. In the late 1970s and early 1980s, as the expansion of oil production in the Soviet Union slowed down (to near zero growth in 1982), supply constraints on exports to Western Europe began to emerge. These were temporarily offset by the sharp rise in the international price of oil in 1979-80, which permitted high export earnings to be realized even though the volume of exports to the West was cut back (after 1978).

10. As the international price stabilized in 1981 and then weakened in 1982, the maintenance of hard currency earnings from oil exports to Western Europe (in nominal, much less in real, terms) grew increasingly problematic. The Soviet reaction has been to increase export volume as much as possible, in part through diversion of exports from Eastern Europe.

11. Decreases in the export price of oil in early 1983, in the face of further softening of the world market, made it doubtful that in 1983 the volume of oil exports to the West could be increased

sufficiently to prevent a decline in their nominal value. In the longer run, the prospect of a downward trend in the real price of oil, combined with a levelling off of Soviet output, augur a diminished role for oil in hard-currency export earnings. Should the real price of oil on export markets fall sufficiently, the profitability of Soviet oil exports could be placed in question. The average real cost of Soviet exports presumably is rising, given the higher marginal costs of oil production as an increasing share of output is sourced from more difficult and distant Siberian locations.

12. These circumstances have magnified the relative importance of Soviet exports of natural gas to Western Europe in the 1980s and of plans to more than double Soviet gas export capacity by the end of the decade.

13. The later development of the Soviet gas industry has meant that exports of gas to Western Europe are a more recent phenomenon, beginning in 1966. The Soviet Union became a significant net exporter of natural gas only after 1973. Soviet exports of natural gas are transported by pipeline. Because of the interconnected nature of the pipeline system required, Soviet exports of natural gas to Eastern and Western Europe have been developed simultaneously.

14. As a result of a series of agreements concluded with West European importers, Soviet gas exports rose from 5 bcm in 1974 to nearly 25 bcm in 1980. These exports went to five West Euro-

pean countries: the FRG (which received nearly half), Italy, France, Austria and Finland (which imports Soviet gas and oil under the terms of a bilateral trade and clearing agreement).

15. From the outset, the Soviet Union has relied on materials, equipment and associated technology from the West for the development of its gas sector. Imports of large-diameter pipe and related pipeline equipment have been especially significant in this respect. These imports have been financed to a large degree by long-term credits which are repaid with receipts from gas exports. This "compensation" format has played a fundamental role in the development of Soviet-West European gas relations.

16. The motivation for Soviet gas exports is broadly similar to that underlying oil export policy: to generate hard currency earnings. There is an important difference, however. While oil is a "fungible" commodity which can be used (almost like gold) to meet changing short-term balance of payments requirements, gas exports lack this flexibility. Transportation factors are such that gas exports must be tied to long-term supply contracts, and are limited by the pipeline capacity available. Hence we find a more stable export pattern than for oil, with increases in the level of of exports occurring as new pipeline capacity is added.

17. Furthermore, the import-dependence of Soviet gas industry development (especially pipeline transport) has been such that gas export earnings have been effectively tied to it. The compensation format merely serves to formalize in some instances what is a more general relationship.

18. The biggest (and most contentious) compensation deal to date in Soviet-West European gas relations is for cooperation in the construction of a major new export pipeline to bring Siberian gas to West European customers. Contracts for the increased supply of gas from 1984 were signed with five West European countries in 1981-82, with the possibility of more to be added. Meanwhile, purchases of western pipe and equipment on liberal credit terms were arranged with the help of a Franco-German consortium. The attempt of the US government to block the project was abandoned in November, 1982.

19. It is estimated that through the early 1980s, earnings from Soviet gas exports to western Europe have been more than offset by Soviet imports from the West for gas field development and pipeline construction. In fact, a large sectoral deficit in trade with the west has been incurred, which interest obligations on Western credits serve to increase further. The purchases for the new export pipeline and the other pipeline construction projects in the USSR will add to this deficit in the current (1981-85) five-year plan period. "Net" earnings from gas exports (earnings available for unrelated balance-of-payments purposes) are still far off.

20. How distant depends on the projection of future gas exports to Western Europe. In 1981-82, gas exports are not likely to have much exceeded 1980 levels, because of constraints imposed by existing pipeline capacity, especially in the transit system through Czechoslovakia. Current pipeline construction will permit increases which would bring potential exports up to 50-55 bcm annually by 1985. Further significant increases must await the completion of the new pipeline construction program launched in the current five-year plan period and its extension through Czechoslovakia. This may not occur until well into the next five-year plan period (possibly not before 1988).

21. Actual exports may be below this projected capacity -- not because of any anticipated lack of an exportable surplus of gas in the USSR, but because of insufficient West European demand. By the late 1980s, it now seems likely that the volume of exports to Western Europe will not exceed 65 bcm. This is still, however, about two-and-a-half times the current volume.

22. Whether the value of this projected volume increase in Soviet gas exports to Western Europe can offset the projected decline in the value of oil exports described above is problematical. The longer-term trend in the volume of Soviet oil exports is still not clear, and movements in the international prices of both oil and gas remain uncertain.

23. Two important conclusions nevertheless seem inescapable:

-- The real value of Soviet exports of oil and gas combined is likely to decline from its 1980-81 level. Hence the contribution of hydrocarbons to the Soviet balance of trade with the west will fall over the decade.

-- The shifting structure of Soviet hydrocarbons exports to Western Europe, from oil to gas, will reduce the balance of payments flexibility from any given level of hard-currency earnings, because of the tied nature of gas exports.

24. The long-term substitution of gas for oil in Soviet exports has important implications for the balance of energy, and energy-related, dependence in Soviet-West European relations. We argue that the shift will significantly increase the interdependence of the Soviet Union and Western Europe. The Soviet Union will be by far the most important extra-regional supplier of gas to Western Europe, and the import dependence of major West European economies on Soviet gas will be much greater than it ever was on Soviet oil. On the other hand, the shift will, in the foreseeable circumstances, serve to weaken the balance of payments position of the Soviet Union vis-a-vis Western Europe. Soviet dependence on the realization of energy export contracts will increase and Soviet flexibility in pursuing an independent energy export policy will be reduced.

III. OIL AND OIL PRODUCTS

A. The Origins of Soviet Oil Export Policy [1]

Western Europe has played a major role in Russian and Soviet oil development and trade. Western firms (Nobel of Sweden, Rothschild of France) developed the Baku oil fields under Tsarist concessions, and prior to the October Revolution of 1917, Russian oil was exported to most West European countries [2]. In the early years of this century Russia was a major, and in certain years the leading, oil exporter in the world, with Western Europe its principal market. War and revolution caused a protracted disruption in oil production and exports, but in the latter half of the 1920s, Russian (Soviet) oil was again being exported to Western Europe.

The recovery of domestic production and the import requirements of the new industrialization drive, launched with the First Soviet Five-Year Plan (1928-32), prompted an attempt to re-establish the traditional export position of oil. The resulting export drive aroused fears in the west, now sliding into depression, and the major Western oil companies charged that the USSR was engaged in a disruptive oil "offensive" on world markets, through the medium of excessive price discounts. Ironically, one of the reasons why the Soviet Union felt forced to offer such discounts in order to break into the market, was the refusal of Western oil majors, such as Shell and Jersey Standard, to market Soviet oil, as they had for a time after the revolution [3].

The USSR also sought to circumvent this problem by the establishment of its own distribution network in some west European countries. To this end it established joint stock companies, sharing equity with western partners. Some of the most important of these companies were Russian Oil Products (UK), Deutsche-Russische Naphtha (Germany) and Nordiska Bensin (Sweden) [4]. Elsewhere, the USSR sold directly through its trade missions, or through agents. Some West European governments (Italy, France) also purchased directly from the USSR at this time.

The creation of subsidiary companies in Western Europe revealed the Soviet aim of re-establishing itself as a permanent supplier to West European markets. Western competitors eventually came to accept --or at least tolerate -- the Soviet role and even worked out market-sharing agreements with the USSR [5].

Soviet oil exports increased steadily during the late 1920s and early 1930s, reaching a peak of 6.1 million metric tons (mmt) in 1932, according to official Soviet foreign trade statistics. Around this time Soviet deliveries to Western Europe reportedly accounted for 15-20 percent of the region's total oil requirements [6]. Thereafter Soviet oil exports began to fall off, owing to the decline in the Baku fields and to the rapid expansion of domestic demand for oil generated by the industrialization drive. By the end of the 1930s, Soviet oil exports had fallen to less than 1 mmt per year.

The USSR did not reemerge as a major world exporter of oil until the late 1950s (in 1950, it was even a small net importer). With the opening up of important new fields in the Volga-Urals region

(the "second Baku"), Soviet oil exports to Western Europe grew rapidly, rising from 1.7 mmt in 1955 to 11.6 mmt in 1960. Aggressive marketing and price discounts also contributed to this rapid growth. The USSR re-established its marketing network in Western Europe through the reactivation of existing joint stock companies and the creation of new ones. Soyuznefteexport, the foreign trade organization responsible for oil exports, had retained considerable expertise with regard to world market operations.

As a result, recriminations once again flowed from Western quarters, both industry and government, charging not only that the new Soviet oil offensive was a threat to the stability of the world oil market but, in the prevailing political climate of the Cold War, that it constituted a major challenge to Western freedom and democracy [7]. As with the previous oil offensive, however, Western alarm proved exaggerated. Soviet behaviour did not appear to differ markedly from those of the numerous other "independent" oil companies which were also attempting to break into the rapidly expanding, but tightly controlled, world oil market at this time. Several analysts have since pointed out that the Soviet Union raised prices in 1961, after establishing a market share in Western Europe, and was even underbid on occasion by Western oil majors in the following year [8]. Furthermore, the Soviet share of the West European market for oil had risen only to 5 percent in 1960 (compared with as much as 20 percent in the early 1930s); and three-quarters of the 10 mmt increase from 1955 to 1960 went to only three countries: the FRG, Italy and Sweden (see Tables 4 and 5). In short, the Soviet Union

did not attain the power on West European oil markets that alarmists feared.

Nevertheless, the reemergence of the Soviet Union as an oil exporter, along with the rise of new "independents", did contribute to changes in the structure of the world oil market. Prices fell and the oligopolistic control by the majors was challenged. The fall in prices, which meant less tax revenue for the oil-producing and exporting countries, also contributed to the creation of the Organization of Petroleum Exporting Countries (OPEC) in 1960.

In the post-war, as in the prewar, period, oil was exported to Western markets in order to finance the continuing import requirements of the Soviet industrialization drive. Once the economy was restored from the ravages of the Second World War and began to grow rapidly in the 1950s (at an average rate of just over 10 percent per annum, according to official Soviet statistics), import requirements grew more than apace. Over the decade of the 1950s, Soviet imports from the "developed capitalist countries" increased five-fold, from 204 to 1,004 million rubles, an average annual growth rate of 18 percent [9]. These requirements began to exceed export capabilities and consistent trade deficits with the West emerged [10]. Almost "as good as gold" in its capacity to earn convertible currencies on Western markets to fill the balance of payments gap, oil exports were an attractive solution to the balance of payments dilemma.

The ability to generate oil exports to meet the continuing need for

convertible currencies to finance imports from the West depended in the 1950s, and continues to depend to this day, on Soviet domestic production trends. The post-war discovery (1948) and subsequent exploitation of the supergiant Romashkino field in the Volga-Urals region assured long-term, surplus oil production for exports. The field was relatively well situated to deliver oil to Black Sea ports, for shipment by tanker to the southern regions of Western Europe. In the early 1960s, a northerly pipeline was also built to carry oil to the Baltic port of Ventspils for delivery to the northern countries of Western Europe. The Soviet Union was thereby in a favourable position to supply and market oil in Western Europe. At the same time, world demand for oil was rising rapidly. During the 1950s, world oil consumption grew at an average annual rate of growth of 7.5 percent [11].

By 1960, hard currency earnings from the sale of oil had reached 157 million rubles, or 20 percent of the total value of hard currency exports (Table 1). This was a significant increase from the estimated 29 million rubles in 1955 oil export earnings, and the 7 percent of total hard currency exports it represented. To reach these levels of earnings, oil exports to the West took an increasingly large share of Soviet oil output. In 1960, oil exports to Western Europe, where almost all hard currency oil exports were directed, took 8 percent of total oil production, a sharp rise from 2 percent in 1955 as calculated from official Soviet Statistics.

Table 1

Soviet Hard Currency Balance of Trade and the Share of Oil in Total Hard Currency Exports (1950-1981)*

(in millions of rubles)

Year	Value of Soviet Imports from Hard Currency Markets	Value of Soviet Exports to Hard Currency Markets	Balance in Hard Currency Trade	Value of Soviet Oil Exports to Hard Currency Markets	Share of Soviet Oil Exports in Total
1950	177.3	208.0	30.7	n.a	n.a
1951	207.6	260.6	53.0	n.a	n.a
1952	278.8	254.3	-24.5	n.a	n.a
1953	267.5	234.2	-33.3	n.a	n.a
1954	390.0	331.1	-58.9	n.a	n.a
1955	286.8	406.9	120.2	28.7	7.1%
1956	408.7	449.6	40.9	40.7	9.1%
1957	479.7	507.3	27.6	68.3	13.5%
1958	467.8	526.8	59.0	79.5	15.1%
1959	581.5	669.0	87.5	121.8	18.2%
1960	874.2	779.0	-95.2	156.6	20.1%
1961	877.8	860.9	-16.9	182.2	21.2%
1962	980.9	861.5	-119.4	192.5	22.3%
1963	1093.2	938.6	-154.6	220.2	23.5%
1964	1436.2	982.3	-453.9	215.4	21.9%
1965	1252.1	1155.2	-96.9	214.8	18.6%
1966	1405.3	1349.4	-55.9	256.3	19.0%
1967	1391.9	1521.2	129.3	333.8	21.9%
1968	1725.3	1667.5	-57.8	364.1	21.8%
1969	2010.9	1819.7	-191.2	328.2	18.0%
1970	2267.7	1895.6	-372.1	380.5	20.1%
1971	2354.6	2161.6	-193.0	536.1	24.8%
1972	3136.6	2143.3	-993.3	482.6	22.5%
1973	4226.7	3334.8	-891.9	954.2	28.6%
1974	5544.4	5319.7	-224.7	1945.5	36.6%
1975	8866.7	5221.7	-3645.0	2279.8	43.7%
1976	9834.9	6844.1	-2990.8	3387.0	49.5%
1977	8806.6	7767.1	-1039.5	3820.2	49.2%
1978	9792.4	7697.3	-2095.1	3722.1	48.4%
1979	12109.7	11037.6	-1072.1	6049.7	54.8%
1980	13856.2	13838.4	-17.8	7668.5	55.4%
1981	15388.4	14956.9	-431.5	8390.1	56.1%

*Crude oil and oil products. "Hard currency markets" are defined here according to the Soviet classification of "developed capitalist countries", excluding trade with Finland, which has a bilateral, clearing arrangement in its trade with the USSR.

Source: Vneshniaia Torgovlia SSSR: Statisticheskii Sbornik, various years.

At the beginning of the 1960s, when concerns over the Soviet oil "offensive" were at their height, the Soviet Union raised its prices on the world market, as if recognizing that it could now exploit the inelasticity of the import demand curve for oil [12]. From that time throughout the decade, the USSR settled into a set pattern with respect to its oil exports to Western Europe. With the exception of a small decline in 1969, Soviet oil exports to Western Europe rose continuously over the decade, from 11.6 mmt in 1960 to 29.8 mmt in 1970. This growth essentially kept pace with increases in West European demand. Thus, the Soviet Union's market share remained relatively constant, hovering in the vicinity of 4-5 percent of total West European oil imports. The value of those exports rose at a somewhat lower rate, reflecting the decline in world market prices over the decade; but they consistently made up around 20 percent of total hard currency export earnings (Table 1). At the same time, the share of total Soviet oil production exported to Western Europe also remained relatively constant, around 8 percent. Thus, in relation to market share, to the percentage of total production and to the percentage of hard currency earnings, oil exports to Western Europe displayed a definite consistency throughout the 1960s, or at least until 1969.

B. Developments in Oil Export Policy Toward Western Europe in 1970-80

By 1970, the Soviet Union had established a position in the West European oil market. However, no clear economic determinant of Soviet oil export policy was apparent. In the 1970s, with the sharp increases in the world price of oil a more discernible strategy could be observed. In this section we put forward evidence for the hypothesis that the volume of oil exports to hard currency markets, primarily Western Europe, is geared to a pre-targeted level of desired hard currency earnings determined by total hard currency needs. Following this line of thinking, the Soviet Union will lower the volume of its oil exports when the world price rises and raise exports when the price falls. An important assumption here is that the Soviet Union is a price-taker on the world oil market [13].

In the early 1970s, the growth of Soviet oil exports to Western Europe began to level off (see Table 2). The market share fell to slightly below 4 percent in 1972. At that time, some analysts saw this development as linked to a slow-down, in the early 1970s, in the rate of growth in oil production [14]. The absolute volume of Soviet oil exports continued to increase in this period, however, so a supply constraint did not appear to be the reason for the falling growth rate in Soviet oil exports to the West. There must have been other reasons.

One possibility was that the opportunity cost of exporting oil had increased, as the cost of producing fuels within the Soviet Union rose [15]. If the cost of using other substitute fuels exceeded the export revenue from oil (calculated in terms of standard fuel equi-

valents), this argument would have validity. The difficulty of comparing domestic costs of fuel production with hard currency earnings from oil precludes any conclusive analysis along these lines. Moreover, as noted, total exports were increasing [16].

There was, however, some correlation between hard currency earnings and the level of oil exports to the West. In the early 1970s, the Soviet Union managed to keep the share of oil in total hard currency export earnings at above 20 percent, and in 1971, despite the small decline in the volume of exports to Western Europe, the value increased sharply, from 381 million to 536 million rubles, with rising world prices [17].

Table 2

The Volume of Soviet Exports of Crude Petroleum and Petroleum Products by Major Importing Regions, 1950-1980

Year	Total Exports in mmt		Share to CMEA in mmt (in %)		Share to Western Europe in mmt (in %)	
	C	P	C	P	C	P
1950	0.3	0.8	0.3 (100)	0.4 (50)	n.a.	n.a.
1955	2.9	5.1	1.7 (58.6)	0.5 (9.8)	0.3 (10.3)	1.4 (27.4)
1960	17.8	15.4	6.2 (34.8)	3.1 (20.1)	6.2 (34.8)	6.0 (38.3)
1965	43.4	21.0	18.3 (42.1)	4.3 (20.4)	12.1 (27.8)	7.2 (34.2)
1970	66.8	29.0	34.4 (51.4)	6.2 (21.3)	17.5 (26.1)	12.3 (42.4)
1971	74.8	30.3	40.2 (53.7)	4.7 (15.5)	17.2 (22.8)	12.4 (40.9)
1972	76.2	30.8	49.1 (64.4)	7.0 (22.7)	16.3 (21.2)	13.7 (44.1)
1973	85.3	33.0	55.1 (64.5)	7.8 (23.6)	16.0 (18.7)	14.0 (42.4)
1974	80.6	35.0	59.2 (73.4)	7.4 (20.7)	8.2 (10.0)	15.3 (42.6)
1975	93.1	37.5	63.9 (68.6)	7.7 (20.6)	12.2 (13.1)	20.1 (53.8)
1976	110.8	37.7	68.8 (62.0)	9.3 (24.6)	22.5 (20.3)	17.3 (45.8)
1977	112.8	33.3	72.4 (64.1)	8.4 (25.2)	24.1 (22.2)	17.0 (51.0)
1978	114.9	40.1	75.2 (65.4)	9.8 (24.4)	25.6 (22.2)	22.4 (56.1)
1979	117.0	41.0	77.7 (66.4)	12.5 (30.4)	24.5 (21.0)	19.1 (46.5)
1980	122.0	44.2	79.2 (64.9)	n.a	20.7 (16.9)	18.7 (42.0)
1981	n.a	n.a	n.a	n.a	18.9 n.a	20.3 n.a

Total exports: data for 1950-1976 from Vneshniaia_Torgovlia; 1977-1979 figures are totals of regional breakdowns based on partner trade statistics, and on United Nations, 1980_Yearbook_of_World_Energy Statistics.

C=Crude; P=Products

CMEA includes the six Eastern European Countries, Mongolia, Cuba from 1972 and Vietnam from 1978. Sources include Vneshniaia_Torgovlia_SSSR and Statisticheskii_Ezhegodnik_Stran_Chlenov_SEV for various years; United Nations, 1980_Yearbook_of_World_Energy_Statistics; National Foreign Assessment Centre (Washington D.C.), International_Energy Statistical_Review; and numerous press reports.

Western Europe defined as OECD Europe, less Finland, Turkey and Yugoslavia. Data from Vneshniaia_Torgovlia_SSSR for 1950-1965, and for 1970-1980 from individual country foreign trade yearbooks and OECD, Statistics_of_Foreign_Trade,_Series_C,_Trade_by_Commodities,_Market Summaries:_Imports, various years.

More vivid evidence for the "hard currency hypothesis" emerged during the 1973-1974 oil price explosion [18]. In 1973, whereas the volume of Soviet oil exports to the West remained constant, revenue from those exports doubled, reaching almost one billion rubles. The possibility emerged that the Soviet Union's hard currency import bill bill could be offset by revenues earned from a lower volume of oil exports. Soviet crude and product exports to Western Europe were cut from 30 mmt in 1973 to 23 mmt in 1974. Earnings, however, doubled again, to almost 2 billion rubles. It appears that the Soviet Union, taking full advantage of price movements on the world market, adjusted the volume of exports in accordance with hard currency earnings requirements. As a result, the Soviet Union's share by volume of the West European market fell to 3 percent, and the percentage of Soviet oil output exported there declined to 5 percent (Table 3).

The oil price increases contributed vitally in the 1970s to the Soviet Union's ability to pursue its program of economic modernization through continued acquisition of Western plant, equipment and technology, despite the growth of hard-currency imports of grain [19]. Oil exports to the West made up an increasingly important share in total hard currency earnings. In relation to total hard currency receipts, oil's share rose from 20 percent in 1970 to 44 percent in 1975, and to 55 percent in 1980. On the margin, oil revenue represented an even greater share of total hard currency earnings. Over the 1971-1975 period, the growth in oil revenue accounted for 57 percent of the rise in total hard currency earnings (1.7 billion of 3.1 billion rubles) and this share was maintained

at approximately the same level in 1976-1980.

The development of the giant oil fields of west Siberia in the late 1960s and early 1970s, following the attainment of peak production at Romashkino, guaranteed continued surpluses for export. In the mid-1970s, however, cautionary voices were heard in the Soviet Union, including remarks made by the Minister for the Petroleum Industry, calling attention to the falling reserves-to-production ratio, and a more moderate rate of oil extraction was advocated by some specialists [20]. Oil nevertheless continued to be relied upon to satisfy the growing energy demands of the domestic economy and of Eastern Europe, as well as to replenish hard currency reserves; and the extraction of West Siberian oil grew rapidly [21].

Table 3

Shares of Soviet Oil in Total Oil Imports of West European Countries

(in percent, based on volume)

	1955	1960	1965	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
Austria	2.3	n.a	17.0	15.7	14.4	11.3	13.0	10.3	14.1	15.4	20.0	19.5	15.9	13.6
Belgium-Lux	0.4	2.0	0.7	2.4	2.9	2.1	2.5	1.6	2.6	2.1	3.8	3.6	3.1	5.7
Denmark	negl.	3.0	3.5	2.8	2.8	3.5	4.4	3.7	6.7	8.5	11.3	14.0	11.5	9.2
West Germany	negl.	6.7	4.2	4.4	4.2	4.2	3.8	4.8	5.9	6.3	6.5	6.3	6.8	4.8
France	1.1	2.3	2.6	2.4	3.3	2.5	3.3	0.9	2.5	2.7	3.7	4.1	4.7	6.7
Great Britain	0.1	0.4	negl.	negl.	0.1	0.2	0.3	0.3	1.3	3.6	4.9	5.7	3.9	2.2
Greece	6.4	41.0	24.1	16.6	11.8	9.2	4.2	3.5	6.9	10.4	7.7	16.3	5.0	3.0
Iceland	n.a	88.5	85.4	71.5	80.7	72.0	72.7	74.1	78.1	84.3	49.1	70.8	58.7	63.3
Ireland	0.0	0.0	0.0	4.9	n.a	n.a	2.8	4.9	8.0	1.6	8.5	6.9	6.7	2.3
Italy	1.1	15.4	10.5	9.4	7.6	9.4	8.5	4.5	5.8	9.2	8.3	7.2	5.5	6.1
Netherlands	0.0	0.0	0.0	0.9	0.9	1.4	1.3	2.3	3.5	2.9	2.6	3.8	3.9	5.3
Norway	1.3	6.5	4.9	4.1	5.9	3.4	3.7	2.9	2.7	1.9	6.3	8.5	7.9	2.5
Portugal	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	11.4	16.3	15.7	11.7	9.8	5.7
Spain	0.0	0.0	2.7	0.4	0.7	1.8	0.9	0.3	2.0	2.3	1.2	0.9	2.1	2.7
Sweden	9.2	14.9	14.6	15.1	16.3	15.3	12.4	11.4	14.6	4.2	4.5	15.2	13.4	7.7
Switzerland	0.0	0.7	14.1	2.3	2.3	1.9	1.7	5.4	6.2	14.0	18.6	24.0	17.7	21.3
Total	1.0[a]	5.3[b]	4.6	4.1	4.0[c]	3.8[c]	3.6	3.0	4.6	5.3	5.6	6.6	5.7	5.7

a - excluding Iceland; b - excluding Austria; c - excluding Ireland

Source: OECD, Trade by Commodities, Market Summaries: Imports, Series C, various years.

The rapid development and high rates of extraction of the west Siberian fields was one of the factors which led the United States Central Intelligence Agency and other western analysts of the Soviet oil industry to conclude that Soviet oil production would peak before 1980, and fall off sharply between 1981-1985 [22]. These predictions have not proved true, and the CIA has since readjusted upwards its projections of Soviet oil production over the 1981-1985 period.

It is nonetheless clear that the high levels of production maintained over the 1970s, despite the failure to discover major new reserves, were achieved at the expense of future production [23]. Throughout the decade, the ratio of proven reserves to production fell in the Soviet Union. By 1979, it stood at an estimated 14/1 in comparison with a ratio of 23/1 in 1970 [24].

The rapid exploitation of the west Siberian fields was partly motivated on the need to generate surpluses for export to hard currency markets. That this decision was made despite the recognized danger of over-production, points to the critical role of hard currency oil exports in overall Soviet plans for development of the economy.

In the face of softening world market prices for oil, the volume of Soviet exports to Western Europe began to rise rapidly again in 1975 (see Table 2). By 1978 Soviet oil exports to Western Europe had reached nearly 50 mmt. So long as Soviet oil output continued to grow at even moderate rates, production was adequate to provide for annual increases in domestic consumption and in deliveries to Comecon countries with sufficient quantities remaining to expand exports to the West as necessary to maintain hard currency revenue targets. The ave-

rage annual rate of growth of output in the 1976-1980 period was about 4 percent, but growth fell from 6 percent in 1976 to 3 percent in 1980.

The second international energy crisis, and attendant price rises in 1979-1980 allowed the Soviet Union to increase dramatically its hard currency earnings from oil exports, while reducing their volume (see Tables 1 and 2). The share of oil in total hard currency exports rose to nearly 55%, and in 1980 the USSR was almost able to balance its hard currency trade [25]. The downward adjustments of the volume of exports in the face of price rises in 1979-80 provide further support for the hypothesis of hard currency requirements as the major, short-term determinant of the level of Soviet oil exports to Western Europe.

Despite the windfall gains from the world oil-price rise, several factors served to cloud the longer-term outlook. It was becoming clear that, on the basis of proven reserves, maximal oil output was being approached. Growth of output in Western Siberia was increasingly offset by declines in the Volga-Urals and other older, oil-producing regions. A major new discovery could not affect this situation before the end of the 1980s. As a result, the planned level of oil production in 1985 of 630 mmt set by the 11th Five-Year Plan merely re-established the target for 1980 in the 10th Five-Year Plan, which had not been met [26]. The 1985 target implied an average annual rate of growth of only about one percent during the 1981-1985 plan period.

The projected levelling out of oil output formed part of a Five-Year Plan of unprecedented overall modesty, reflecting a long-term decline

in the growth of Soviet industrial production which had accelerated in the late 1970s [27]. Moreover, Soviet agriculture had also entered a period of difficulties, and 1979-80 was the first of a series of poor crop years which required imports of grain from the west in magnitudes previously unequalled.

These developments demanded a shift in Soviet policy with regard to the allocation and use of oil. In June, 1980, at the 34th Comecon Council Session, Soviet Prime Minister Kosygin announced that oil exports to the Comecon countries during 1981-85 would be held at 1980 levels, and that total energy exports to the region would increase only modestly over the period [28]. Given the five-year, moving average pricing mechanism for Soviet oil exports to Eastern Europe, the opportunity cost to the USSR of the lower-priced oil exports to the CMEA countries increased significantly with the 1979-80 price hikes for oil on world markets. At the same time, a special program for the Soviet energy sector was launched in conjunction with the new five-year plan. Production of non-oil fuels, especially natural gas, was to expand rapidly to meet incremental domestic requirements, and fuels conservation programs were to result in savings by 1985 of 160-170 mmt of standard fuel equivalent, compared to the levels of use in 1980 [29].

C. Structural Trends in Soviet Oil Exports to Western Europe over the 1970s

(1) Crude versus Product Exports

We saw that the volume of total Soviet oil exports to Western Europe could vary from year to year depending in large part upon the hard currency needs of the USSR. To examine these fluctuations more closely, we have broken down total Soviet oil exports into crude and product exports by West European country of destination (tables 4 and 5). Using these data, we may analyse in more detail the trends in both the volume and pattern of Soviet oil exports.

The Soviet Union appears to pursue different export policies with regard to crude and oil products. On several occasions during the 1970s, product exports rose from one year to the next while crude oil exports declined, or vice versa (see Figure 1). Between 1970-1975, oil product exports rose continuously, while crude oil exports fell in each successive year between 1970 and 1974. In 1976 and 1977, the pattern reversed and oil products exports declined while crude oil exports took a quantum leap, from 12 mmt in 1975 to 22 mmt in 1976, and then to 24 mmt in 1977. In 1978, the earlier pattern reemerged, wherein oil product exports jumped by 32 percent and crude oil exports increased only slightly [30].

Table 4

Soviet Crude Oil Exports to Western Europe

(in '000 metric tons)

	1955	1960	1965	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981
Austria	-	531	470	1033	1108	947	1230	841	1119	1493	1862	1966	1721	1415	1711
Belgium-Lux	-	-	-	494	648	523	523	120	21	94	975	547	188	700	932
Denmark	-	-	-	-	-	-	-	-	436	940	1596	1571	1084	773	531
West Germany	-	1241	2583	3437	3318	2845	2735	3018	3093	3325	2855	2789	3639	2847	1082
France	200	132	779	1445	2443	1882	3550	240	1162	1738	2894	3369	4908	6354	5408
Great Britain	-	-	-	-	137	221	168	99	664	2718	2737	2701	1990	109	385
Greece	-	424	422	604	558	601	395	347	860	1230	799	2125	724	283	949
Ireland	-	-	-	-	-	-	-	-	-	32	298	-	157	-	-
Italy	111	3921	6588	9723	8236	7559	6838	3400	3297	8326	7586	6919	5848	5378	4767
Netherlands	-	-	-	-	-	18	-	19	-	23	106	120	587	475	820
Norway	-	-	-	-	-	-	-	-	-	66	552	760	691	106	255
Portugal	-	-	-	-	-	-	-	-	647	1049	1000	799	802	495	687
Spain	-	-	381	122	214	723	350	91	816	1027	464	421	973	1238	878
Sweden	-	-	-	689	762	817	219	-	38	220	356	1250	1155	547	419
Switzerland	-	-	917	-	-	-	-	-	-	176	92	244	49	-	56
Total	311	6249	12140	17547	17188	16261	16008	8175	12153	22457	24132	25581	24516	20720	18880
Finland	-	767	1938	6697	5927	5994	6593	6174	5864	6989	7543	6865	7356	6975	7346

Sources: For 1955, 1960 and 1965, Vneshniaia Torgovlia SSSR, Statisticheskii Obzor. After 1967, the Soviet foreign trade yearbook ceased publishing separate figures for crude and product exports, so data from 1970 are from OECD, Trade by Commodities, Market Summaries: Imports: Series C, various years.

Table 5

Soviet Oil Product Exports to Western Europe

(in '000 metric tons)

	1955	1960	1965	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981
Austria	7	75	13	40	21	20	37	72	84	57	34	23	-	89	8
Belgium-Lux	30	203	137	372	706	425	632	528	895	701	668	882	1127	1681	1559
Denmark	2	153	386	573	582	751	935	745	817	627	545	967	946	540	335
West Germany	5	766	521	2288	2332	3042	3063	3541	4275	5376	4879	5908	5126	3388	4009
France	69	653	833	1174	1309	1400	1189	932	1708	1881	1841	1728	1529	2122	2709
Great Britain	37	218	24	2	2	44	270	350	685	997	1431	1829	902	1199	1153
Greece	95	524	730	427	214	257	182	107	79	131	16	134	94	27	96
Iceland	283	339	402	371	421	380	491	468	443	424	311	430	376	355	293
Ireland	-	-	-	235	n.a	n.a	164	293	434	4	161	385	244	141	165
Italy	72	782	757	1118	814	1534	1336	2227	2866	2000	2558	1574	818	1296	1393
Netherlands	-	-	-	701	786	1380	1462	1606	2230	2123	1681	2507	2401	3113	4569
Norway	36	249	304	445	570	366	428	310	247	142	189	95	112	101	-
Spain	-	-	-	-	51	6	43	33	170	138	195	31	86	197	575
Sweden	726	1968	2804	4259	4287	3799	3541	3344	4459	1070	1045	3069	3143	1798	858
Switzerland	-	29	247	297	307	257	246	716	756	1631	2322	2844	2158	2624	2541
Total	1362	5979	7158	12302	12402	13667	14019	15272	20148	17302	16984	22411	19062	18674	20263
Finland	613	1361	2546	1077	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a

Sources: As for Table 4. After 1970, OECD "Series C" ceased reporting Finnish imports of oil products from the USSR. No reasons were given for this. We expect, however, that Finland continues to import 1-2 mmt of oil products from the USSR annually.

Figure 1: Trends in the Volume of Soviet Exports of Petroleum to Western Europe in the 1970s

Do these trends in crude and product exports reveal an explicable pattern? Figure 1 shows that the degree of fluctuation in crude oil exports is much greater than for oil products. It is reasonable to assume that, in order to maximize its hard currency returns from energy exports, the USSR prefers to keep the export level of the generally more profitable oil products exports high. Even after account is taken of oil consumed during the refining process, a given volume of oil products exports can yield a higher net revenue than an equivalent volume of crude [31]. Within this context, the data for the first half of the 1970s suggest that crude oil, and not a combination of crude and product, is used as the balancing item in hard currency trade. If more or less hard currency is required in a given year, then the level of crude oil exports is raised or lowered accordingly. The best evidence for this was displayed in 1974, when oil product exports rose but crude oil deliveries dropped off dramatically.

This assumption would be strengthened if the fall in oil product exports in 1976 and again in 1979 could be explained. There is reason to believe that the explanation lay primarily on the supply side in 1976. In the mid-1970s the Soviet Union encountered bottlenecks in its oil refining capacity which curtailed the surplus available for export [32]. This was apparently critical in 1976, when there was a marked falling off of Soviet oil products exports to Western Europe. The shortage of refining capacity seems to have carried over into 1977 [33]. The resultant drop in oil product exports in 1976-77 apparently necessitated an offsetting growth in crude oil exports, in order to reach the required level of hard

currency earnings, especially as the world oil price, in real terms, was falling at the time. Again, crude oil performed the balancing role.

A new pattern emerged in 1979 when, after a jump to an unprecedented high in 1978, products exports fell off again, accompanied by a reduction, albeit at a slightly lower rate, in crude oil exports (Figure 1). Because of surging world prices, the reduction in oil exports still allowed for substantial gains in hard currency revenue. But why did oil product sales in Western Europe decline more than crude oil exports? While capacity constraints again may have played some part, it is more probable that exceptionally high prices of crude oil on the spot market at the end of 1979 induced Soviet traders to direct a higher share of crude oil for sale on the Rotterdam market. Under the prevailing conditions of rapidly inflating spot market prices, crude oil exports may well have been more profitable than oil product sales at the time.

We feel that there is enough evidence to suggest a corollary to our main hypothesis on Soviet oil export policy in the 1970s. The USSR has, under normal conditions of higher profit margins on product sales, attempted to raise the share of oil products exports to Western Europe, and to use crude oil to make up the difference needed to maintain a desired level of hard currency receipts. Under such a policy, it may be expected that, in the event of a reduction in the volume of oil exported to hard currency markets, crude oil will be cut back more than products. This point becomes important when we turn to developments and prospects in the 1980s (below).

(2) The Geograpnical Pattern of Exports

From the time tne Soviet Union began its oil export drive in the 1950s, and throughout the 1960s, three countries figured prominently as Soviet markets in Western Europe. In 1960, the FRG, Italy and Sweden accounted for 70 percent of total Soviet oil exports to Western Europe. In 1970, the three countries' combined share remained about the same. During the 1960s, increases in Soviet exports therefore resulted mainly from higher exports to these traditional customers. Nevertheless, several new customers were added for Soviet crude (Belgium and Spain) and products (Ireland and the Netherlands) over the course of the decade.

We noted in the previous section that the USSR's share of Western Europe's oil imports was a low 4-5 percent. The import dependence on Soviet oil of the major importers (in order of magnitude, Italy, the FRG and Sweden) was also not great. By 1970, Italy received 9 percent of its oil imports from the Soviet Union; the FRG a low 4 percent; and Sweden, the highest share of 15 percent, which later declined (Table 3).

Several smaller importing countries exhibited greater import dependence on the Soviet Union in 1970: Iceland (72 percent), Greece (17 percent) and Austria (16 percent). Together, however, these countries imported only 8 percent (2.5 mmt) of total West European oil imports from the USSR. Significantly, then, the three countries with the highest dependence on the Soviet Union imported relatively small quantities of oil, easily replaceable from other sources.

During the 1970s, the FRG, Italy and Sweden held their imports of Soviet oil at relatively stable levels. In 1979, these three traditional markets imported 19.7 mmt of Soviet oil, compared to 21.5 mmt in 1970. Other countries, in particular Denmark, France, the Netherlands and Switzerland, substantially increased their imports. Of the 13.7 mmt increase in Soviet oil exports to Western Europe between 1970 and 1979, these four countries took 9.5 mmt, or 70 percent.

As a result, the Soviet share of the oil import market in some cases increased dramatically over the 1970s. For instance, the Soviet share in Switzerland's oil imports jumped from 2 percent in 1970 to 18 percent in 1979, having reached a peak of 24 percent in 1978. Denmark's imports of oil from the USSR rose from 3 percent of total oil imports in 1970 to 12 percent in 1979, with a high of 14 percent in 1978. However, the three largest importers of Soviet oil in 1979, the FRG, France and Italy, relied upon this source for only 5 to 7 percent of their total oil imports (Table 3).

From the mid-1950s, no West European country relied upon Soviet oil to the point where it could be classified as vulnerable to a cut-off in that supply. The one country which did have a high dependence on Soviet oil, Iceland, imported so little (on average, 400,000 metric tons annually) that had the Soviet Union suddenly ceased all exports, another source could easily have filled the gap. When the low level of West European dependence on Soviet oil is compared to the importance of Western Europe as a market for Soviet hard currency oil exports, it is apparent that the Soviet Union depended much more on these markets than Western Europe depended on Soviet oil.

The growth in Soviet oil exports to Western Europe during the 1970s came primarily through the addition of new markets. This was a switch from the pattern of the previous decade, when the rise in oil exports was the result of increased deliveries to the traditionally largest importers. One year, 1978, proved to be an exception. At a time when overall West European oil imports were declining, and when doubts were being voiced in the West about production prospects in the Soviet oil industry, the USSR raised its oil exports to Western Europe, including traditional markets, by 17 percent, capturing for itself a larger market share than it had at any other time in the 1960s and 1970s. Exports to long-standing purchasers, such as Sweden and Greece, jumped by 208 and 178 percent respectively, after having fallen off in previous years. At the same time, exports to the newer markets rose substantially - by 32 percent to the Netherlands, 28 percent to Switzerland, and 19 percent to Denmark. These higher export levels were not maintained after 1978, however.

On those occasions when the Soviet Union significantly reduced its oil exports to Western Europe, Soviet strategy seemed to be the exact opposite to the "shotgun approach" adopted when oil exports had to be raised. The cutbacks were selective, focused on one or two countries. For example, in 1974, when crude oil exports declined by 7.8 mmt, almost 90 percent (6.7 mmt) of that reduction was to two countries, France and Italy. In 1976, when oil product exports fell by 2.8 mmt, deliveries to Sweden were 3.4 mmt lower than in the previous year.

The expansion or reduction in the volume of oil exported to Western Europe is easily managed because of the mechanism in place for selling

oil in these markets. The network of Soviet subsidiary oil companies is one channel for raising or contracting oil exports. The Rotterdam "spot" market for crude oil is another. Moreover, the Soviet Union usually contracts with West European purchasers for deliveries of oil on a twelve-month basis, in contrast to the five-year, general trade agreements it makes with its Comecon allies. Reportedly, some of these contracts even carried an option whereby contracted supplies could be cut by up to 10 percent [34]. Only in exceptional cases, for example, a ten-year trade and cooperation agreement signed in December 1980 with Rhone-Poulenc of France, will the Soviet Union commit exports of oil to a West European country on a long-term basis [35]. The USSR clearly prefers a year-to-year flexibility in setting oil export levels to western Europe, which is logical within the context of the hard currency hypothesis.

A sudden fall in volume can, of course, emanate from the demand side. A traditional purchasing company in Western Europe might decide to cease importing Soviet oil, precipitating a sudden change in the volume of Soviet oil exports to hard currency markets. An unpredictable move of this nature would disrupt Soviet plans for the generation of hard currency earnings through oil exports. During the 1970s, however, the West European demand for Soviet oil was relatively stable.

D. Prospects for Soviet Oil Exports to Western Europe in the 1980s

The volume of Soviet oil exports to western Europe fell in 1979, and again in 1980. Lower export volumes in 1979-80 could not in themselves be interpreted as a new downward trend in the volume of exports. Because these reductions were accompanied by a growth in hard currency earnings, the pattern was not inconsistent with earlier Soviet oil export policy. Moreover, in 1978, the USSR had displayed its ability to boost suddenly and substantially the volume of its oil exports to western Europe. (Recall that export volume rose by 17 percent and its share in Soviet oil production increased from 7.5 to 8.4 percent).

New developments, especially on the supply side, however, suggested that the downward trend might continue. In an earlier paper, we calculated possible future levels of Soviet oil exports to hard-currency markets, in light of the planned growth of Soviet oil output and Soviet national income, and announced intentions with regard to deliveries to Comecon countries, in the 1981-1985 plan period [36]. On this basis it appeared highly unlikely that the volume of Soviet oil exports to western Europe could be maintained at the peak level of close to 50 mmt achieved in 1978. On the contrary, it seemed that the decline initiated in 1979 would continue through the first half of the 1980s, falling to a level of 20-25 mmt by 1985.

Events in 1981-1982 have borne out some of the assumptions on which this projection was based, and weakened others. In the first two years of the eleventh five-year plan, Soviet oil output has been

generally within the planned range, growing at declining annual rates of 0.9 and 0.6 percent respectively. On the other hand, Soviet national income (net material product) has grown at a below-plan rate of 2.9 percent, thereby generating a lower-than-projected domestic demand for oil. At the same time, Soviet deliveries to Comecon countries have been cut below the originally intended level (by a planned factor of something under ten percent). These developments have served to relax some of our projected supply constraints on Soviet oil exports to Western Europe. Nevertheless, with domestic oil demand growing more rapidly than domestic output and CMEA requirements for additional supplies still pressing, the situation remains tight on the supply side.

The weakening of the international market for oil and the consequent softening of the world price in 1981-82 have also served to alter the outlook. On the one hand, they should -- on the basis of past behaviour -- prompt the Soviet Union to expand its oil exports to Western Europe to maintain the level of export earnings [37]. On the other hand, the weak market conditions, as well as the constraints on the supply side, inhibit Soviet abilities to pursue this old strategy.

In the course of 1981, there were a number of indications that Soviet deliveries to Western Europe continued to decline. In March, the USSR reportedly informed Italy that crude oil exports would be cut by about 25 percent in 1981 [38]. Other West European importers of Soviet oil indicated that contracts negotiated at the beginning of 1981 were for volumes of crude oil 15 to 30 percent below those of the previous

year [39]. Then, in the Summer of 1981, Veba Oel AG, the principal West German importer of Soviet oil, announced that, for the first time in twenty years, it would not renew its contract to purchase Soviet crude in 1981. The company reportedly imported 1.9 mmt of Soviet crude oil in 1981 [40]. These reports all concern cutbacks of Soviet exports of crude oil.

Statistics for 1981 show that while Soviet crude oil exports to Western Europe declined further in 1981, from 20.7 mmt to 18.9 mmt (Table 4), exports of oil products rose from 18.7 mmt to 20.3 mmt. Total Soviet oil exports to Western Europe therefore declined only marginally. A softening world price and reduced demand for Soviet crude were partially offset by a modest rise in product exports.

Demand factors in Western Europe appear to be the explanation for the decline of Soviet crude exports. Nonetheless, with a higher average price for Soviet crude in 1981 than in 1980, and a higher volume of product sales, total earnings from oil exports to Western Europe increased by 9.4 percent over 1980 (see Table 1). These higher earnings from energy exports could not offset the growth in the USSR's hard currency imports of grain as well as pipe and equipment for its ambitious gas pipeline projects (see below). Accordingly, the Soviet Union's trade balance deteriorated in 1981.

Data for 1982 remain incomplete. Soviet oil output has yet to peak, but growth was under one percent. On the export side, the Soviet Union faced an absolute decline in the nominal price of its exports to Western Europe, with the export price of Soviet crude falling from US$35.20/bbl to US$31.50/bbl, in the course of the year [41]. Preli-

minary data indicate that, despite this, the Soviet Union was able to increase the value of exports to the West substantially, by a reported 23 percent [42]. It is not possible to determine, on the basis of the data available at this writing, through what possible combination of reduced domestic consumption, cutbacks in deliveries to Eastern Europe and reexports this implied increase in volume was achieved.

In sum, in the early 1980s, the Soviet Union's oil export policy confronts the levelling off of domestic production and the weakening of international markets. It has attempted to maintain hard currency revenues in these circumstances by cutting deliveries to Eastern Europe and expanding export volume as much as possible. But if policy objectives remain the same, traditional export behaviour will be hard to maintain. With continuing, if modest increases in the world price in 1981, the USSR succeeded in increasing the hard currency value of oil exports to the West, if by under 10 percent. In 1982, the USSR may have again increased the value of its oil exports to hard currency markets due to the unexpectedly high growth in the volume of these exports. This further substantiates the hard currency hypothesis of Soviet oil export policy. Subsequent declines in the world price in early 1983 of about 13 percent (the Soviet Union was reported to have lowered the price of crude sold on the Rotterdam spot market to US$27.00/bbl by early March, 1983), seem destined to result in absolute declines in the nominal value of oil exports to hard currency markets in 1983, and substantially greater decreases in real terms. (It seems unlikely that the USSR can in 1983

expand the 1982 volume of exports sufficiently to offset these declines in price). This downward trend in earnings will continue through the mid-1980s, even if the world price stabilizes, if the exportable surplus erodes as a result of declining output.

IV. NATURAL GAS

A. The Rise of Gas Exports in the 1970s

The Soviet Union did not begin concertedly to develop its natural gas industry until the mid-1950s. While late in recognizing the tremendous potential for natural gas production, the USSR then moved quickly to create a major, new fuel industry. Natural gas output in the USSR surged from 9 bcm in 1955 to 198 bcm in 1970 and 435 bcm by 1980. In two decades the Soviet Union had risen to the top ranks of world producers, and will soon overtake the United States as the world leader in natural gas output [43].

Because of the late development of the gas industry, the Soviet Union only began exporting gas in significant quantities in the late 1960s. This did not, however, hinder Soviet attempts to find markets, as world trade in gas was not very extensive, even in the 1960s. World gas trade represented only four percent of total world production in 1970 [44]. Thus, the initiation and expansion of Soviet gas exports in significant quantities in the late 1960s and early 1970s conforms more closely to world trends than does the USSR's history of domestic development of the industry.

Interestingly, Soviet trade in natural gas was from the beginning focused as much on imports as on exports of natural gas. Because of two agreements signed in the 1960s, with Afghanistan and Iran, the Soviet Union was a net importer of natural gas between the years 1970-1973 [45].

The Soviet Union developed its gas exports to Eastern and Western Europe concomitantly. In both cases, materials and equipment advanced on credit were to be repaid through deliveries of gas, according to the compensation format (see following section). Austria was the first West European country to import Soviet natural gas, in 1968, via the 'Bratstvo' gas pipeline system which originated in the Ukraine and traversed Czechoslovakia [46]. Through the expansion of the Bratstvo system in the early 1970s, and the construction of connecting pipelines and spurs, the FRG and Italy began to import Soviet natural gas in 1973 and 1974, respectively [47]. As the result of a 1972 accord, France agreed to purchase natural gas, on Soviet account, beginning in 1976. The deal was a four-way swap, whereby Italy would receive the Soviet gas purchased by France, and France would receive a thermal equivalent in natural gas from the Netherlands, originally ordered on Italian account [48]. France did not begin to receive Soviet natural gas until 1980, when the pipeline link through the FRG was completed.

At about the same time, a major export pipeline project was carried out with the cooperation of a number of East European countries. The Soyuz pipeline, which made possible the export of gas from the Orenburg field, in the Urals, was primarily designed to meet the growing requirements of the Soviet Union's Comecon partners. It nevertheless provided capacity which could be used to serve markets further West, if desired [49].

Excluding Finland, only the four West European countries cited have imported Soviet natural gas to date. These countries are also the principal parties to the Soviet-West European agreements of 1981-82,

to which Switzerland has acceded as well (See Section D below for details on these new agreements).

Table 6 shows the growth in the volume of these imports since their inception in 1968. From a modest 1 bcm in 1970, Soviet gas exports to Western Europe have risen to 24.6 bcm in 1980, representing about 12 percent of total world trade in natural gas (by pipeline and LNG). In 1980, the FRG took somewhat under one-half of this volume (11.9 bcm), Italy approximately 25 percent (6.3 bcm), and the remaining 30 percent was divided between Austria (3.5 bcm) and France (3.9 bcm).

The share of Soviet gas in the total natural gas imports of these four countries, when measured in terms of their thermal value, also increased significantly over this period, from 12.7 percent in 1970 to an estimated 28.4 percent in 1980 (Table 7). The shares varied extensively from country to country. Virtually all (99 percent) of Austria's gas imports come from the USSR. In 1981, Soviet gas accounted for 41 percent of total Italian imports, 24 percent of total imports by the FRG, and 19 percent of total French imports of natural gas (see Table 7).

Gas exports to Western Europe (and Eastern Europe as well) in the 1960s originated from the Khar'kov region of the Ukraine, where the giant Shebelinka field is located. However, by the early 1970s, output in this area began to level off. This, combined with peaking of production in other, traditional gas producing regions in the European USSR and with the discovery of supergiant gas fields in Central Asia and West Siberia, precipitated the eastward shift of gas production in the Soviet Union. This movement in the locus of gas production was especially rapid, and by 1975 almost 50 percent of total gas output was from the Asian regions of the USSR, compared to 14 percent in 1965 [50]. This share rose to almost two-thirds in 1980. Largely on the basis of expanded West Siberian production, total Soviet gas output is scheduled to grow by 7-8 percent annually over the 1981-85 plan period - a goal which most Western specialists regard as realistic [51].

The sourcing of gas exports to Western Europe followed the shift in production. In the early 1970s, natural gas was exported from the Vuktyl deposit in the Komi ASSR through the 4,300 km pipeline system known as "Northern Lights" [52]. Subsequent links from Vuktyl to the larger Medvezh'ye field, and then in the latter part of the 1970s to the supergiant Urengoi field have pushed the source of gas exports further eastward.

The Urengoi field has become especially important in Soviet plans for natural gas development [53]. With estimated reserves of almost 4,000 billion cubic metres, exploitation of this field is pivotal for Soviet

Table 6

Soviet Natural Gas Exports to Western Europe

(in billion cubic meters)

	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981
Austria	0.1	0.8	1.0	1.4	1.6	1.6	2.1	1.9	2.8	2.8	3.2	3.4	3.5	4.0
West Germany	-	-	-	-	-	0.4	2.1	3.1	4.0	5.3	8.6	10.1	10.9	11.6
France	-	-	-	-	-	-	-	-	1.0	2.1	2.8	2.7	3.9	4.1
Italy	-	-	-	-	-	-	0.8	2.3	3.7	7.3	8.8	8.3	6.3	7.4
Total	0.1	0.8	1.0	1.4	1.6	2.0	5.0	7.3	11.5	17.5	23.5	24.5	24.6	27.1
Finland	-	-	-	-	-	-	0.4	0.7	0.7	0.9	0.9	1.0	1.0	0.8

Source: Based upon data from United Nations, Economic Commission for Europe, Annual Bulletin of Gas Statistics for Europe, various years.

domestic needs and for export. By 1992-93, annual production at this one field alone is targeted at 100 bcm, greater than total output in the Netherlands, the world's third largest producer [54].

Table 7

Share of Soviet Gas in Total Natural Gas Imports of West European Countries
(by thermal value)

	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981
Austria	50.4	89.2	97.2	99.7	99.7	99.6	99.6	99.5	99.5	99.3	99.3	99.3	99.3	99.0
West Germany	-	-	-	-	-	2.6	9.6	12.6	15.1	17.5	24.6	24.7	24.3	25.1
France	-	-	-	-	-	-	-	-	7.3	12.3	14.9	13.6	19.3	18.6
Italy	-	-	-	-	-	-	18.0	26.3	38.9	51.8	56.9	46.8	40.5	53.2
Total	3.8	14.0	12.7	12.2	8.8	7.3	12.8	15.6	22.5	27.4	32.4	29.6	28.4	31.4
Finland	-	-	-	-	-	-	100	100	100	100	100	100	100	100

Source: Based upon data from United Nations, Economic Commission for Europe, Annual Bulletin of Gas Statistics for Europe, various years.

Under an agreement concluded in the Fall and Winter of 1981-82 (and to which we shall return below) the Soviet Union is preparing to export, by the mid-1980s, a further 20 bcm of gas annually to four West European countries. (28 bcm if Italy is included - see Table 9 below). Urengoi will again be called upon to source the bulk of these incremental gas exports to Western Europe, at least until the mid-1980s, when the giant Yamburg field, also in Tyumen' Oblast, is scheduled to supplement Urengoi gas for export to Western Europe.

The 1981 agreement is undoubtedly a partial outgrowth of the trilateral "gas swap" arrangement involving the Soviet Union, Iran and a West European gas consortium headed by Ruhrgas AG of the FRG. The trilateral accord, signed in 1975, envisaged Soviet gas exports of 11 bcm to Western Europe and 3.4 bcm to Czechoslovakia. The Soviet Union was to receive 17 bcm from Iran in offsetting gas deliveries, intended to meet the growing needs of the Caucasus region. Although the agreement was abrogated in 1979 by the revolutionary Islamic leadership in Iran and has not been revived since, it revealed the Soviet interest in expanding gas exports to Western Europe [55].

B. Soviet Policy Objectives

From this brief overview of the development of Soviet gas exports to Western Europe, it is apparent that the Soviet Union has a strong interest in continuing and expanding these exports even though it entails costly investment, of both skilled labour and capital, for gas field development and pipeline construction. Moreover, this interest in ex-

port expansion comes at a time when the Soviet Union is increasingly relying upon natural gas to meet domestic energy needs, as both coal and oil production level off. In light of the tremendous technical demands and investment burden involved, and rapidly rising domestic fuel requirements, why is the Soviet Union so determined to continue to expand gas exports to Western Europe?

In certain respects, the motivation is the same as for oil exports - to earn hard currency. But this is only part of the story. The underlying reason for exporting gas to Western Europe stems from an inadequate technological level and a lack of capacity to produce adequate material and equipment for the industry. This characteristic differentiates the Soviet gas industry from the long-established oil industry, which has been developed with less reliance on imported inputs. Earnings from gas exports are effectively earmarked to finance essential imports for the gas industry itself (see below). Accordingly, Soviet gas exports should be viewed primarily as a method for realizing an import-led development strategy in the gas sector.

The reliance of the Soviet gas industry on imported technology and equipment has been studied by Robert Campbell, a long-time analyst of the Soviet energy situation [56]. Campbell suggests that the Soviet gas industry has two critical problem areas where it has not been possible or feasible solely to apply Soviet technology and Soviet-produced equipment and materials. The two trouble spots, both of which relate to gas transportation, are compressors and wide-diametre pipes [57]. Although the USSR manufactures both, the domestic product either

nas not been produced in sufficient quantity (wide-diametre pipe) or is unreliable (compressors).

The most cost-efficient means of transporting gas by pipeline is under high pressure, through wide-diametre pipe. The savings in fixed and variable costs of transportation are significant, as recognized by Soviet specialists [58]. Transportation costs are especially critical in the Soviet case because of the vast distances over which the gas must be pumped, from the remote gas fields in the Asian USSR to consumers in the European USSR. Consequently, Soviet planners and specialists in the gas industry opted for the more efficient wide-diametre pipe (1,020 mm and over) and more powerful compressors. The subsequent decision about whether to develop sufficient indigenous capacities for both or to rely mainly upon Western imports, was resolved, especially in the case of pipe, in favour of the latter [59]. As a result, it is thought that over two-thirds of all wide-diametre pipe used in Soviet gas pipeline are imported, and that all Soviet gas pipelines operating at 75 atmospheres of pressure rely exclusively upon imported pipe [60].

That imports of equipment and technology for the natural gas industry were, from the outset, intended to be financed by gas exports is evident from the "compensation format" traditionally employed by the USSR in its gas export arrangements. Under this format, Soviet purchases of pipe and related pipeline equipment are financed by the extension of long-term, Western credits to the Soviet buyer (or its bank). These credits are then repaid from the receipts of gas exports to the West European importer. The term

of the agreement is usually longer than the period required for repayment of the credits, so gas exports beyond the repayment term will generate cash proceeds [61].

While the first of these deals was concluded in 1968 with the Austrian firm Voest-Alpine, the most celebrated, and largest, contracts have involved Mannesmann Handel and Thyssen Stahlunion of the FRG. In the last decade, numerous contracts have been signed between these companies and Soviet enterprises, the first in 1970. In all of these agreements, the Soviet foreign trade organization, Promsyrioimport, purchased pipe from Mannesmann and Thyssen using credit extended by west German banking consortia. Ruhrgas AG, the privately-owned west German gas utility, acted as lead member of a consortium of west German gas distributors to purchase the return flows of gas. Ruhrgas has signed four long-term agreements with Sojuzgazexport (in 1970, 1972, 1974 and 1981) for the delivery of Soviet natural gas extending beyond the year 2000. Under arrangements now in place, but excluding the huge West Siberia-Western Europe pipeline deal of Fall 1981, the USSR is expected to supply to the FRG, by the year 2000, a total of about 200 bcm of natural gas in exchange for pipes [62].

In examining the relationship between the value of pipe sales by Mannesmann and Thyssen over the 1970s and the value of Soviet gas exports to the FRG, we estimate that all of the Soviet Union's proceeds from gas exports to the FRG to the end of 1980 equaled approximately three-quarters of the cost of imported pipe from the FRG (excluding interest charges on the credit). By the end of 1980,

Mannesmann and Thyssen had sold an estimated $3.3 to $3.8 billion worth of wide-diametre pipe under the pipes-for-gas arrangements [63]. The cumulative value of Soviet gas exports to the FRG over the same period was $2.6 billion, 40 percent of the total value of Soviet gas exports to Western Europe [64]. Hence, even excluding interest charges on pipe credits, and any other purchases by the Soviet gas industry, it would appear that in the case of the FRG gas export revenue in 1970-80 only partially offset the cost of imports of pipe for Soviet pipeline construction.

It is impossible to identify, on the basis of Soviet trade data alone, the total hard currency imports of the Soviet gas industry. However, by summing in non-compensatory purchases of wide-diametre pipe from other western countries (especially Japan), compressor stations, sour gas treatment facilities (for Orenburg and Astrakhan), pipelaying equipment and other ancillary equipment used for pipeline construction, and the interest on credits used for these purchases, it seems highly probable that total hard currency revenue from gas exports has been insufficient to offset the cost of imports by the natural gas industry [65]. In other words, the hard currency balance of trade for the natural gas sector alone has so far resulted in a large deficit for the Soviet Union.

The deficit has thus had to be financed by other earnings and by long-term credits, some raised through gas compensation arrangements. By now, some of the original credits will have been paid off, meaning that a certain volume of natural gas might be supplied to Western Europe for cash. This would reduce the hard currency deficit

in the gas sector. Against this, however, will be further purchases of materials and equipment for the gas industry, which will keep the deficit from being fully eliminated in the near term.

Although Soviet policy on gas exports to the West is similar to oil export policy, in the sense that the motivation for both is to earn hard currency for essential imports, there is then an important difference between the two fuel commodity exports. Gas export revenue has been retained for the needs of the natural gas sector, while oil revenues have been essential for the hard currency import requirements of the economy as a whole. Thus, natural gas has not been used in the way oil has, as the balancing item in hard currency trade. As long as oil export revenue rose continuously, there was in fact no need for natural gas to play that role.

Moreover, natural gas exports are less suited for this purpose as they do not possess the "fungibility" of oil exports. In the first place, the infrastructure (i.e. pipelines or LNG terminals) required for the transportation of natural gas restricts the capability for immediate expansion of natural gas exports. There is no 'spot' market for natural gas. Moreover, contracts in natural gas trade are usually for large quantities over a long term. In general, then, natural gas trade lacks the flexibility of oil.

With the imminent prospect of declining hard currency revenue from oil exports, it has been widely suggested that natural gas will now be relied upon to make up any shortcomings in hard currency oil export revenue. In particular, the massive, new west Siberia-Western Europe natural gas arrangement has been perceived in this light; and at least

one western report anticipates that hard currency revenues from gas exports will be sufficient to more than offset any loss in oil export proceeds in the current decade [66].

Certainly hard currency gas export earnings have been increasing steadily over the past decade, and because of rises in the price of gas exports, particularly in 1980, the share of natural gas in total hard currency earnings rose to 13 percent in that year, compared to 3 percent in 1975. As the preceding analysis demonstrates, however, to make up any loss in oil export revenue, natural gas exports must earn substantially more than the amount needed to continue financing the hard currency import requirements for the development of the natural gas industry. Thus, in determining whether or not the real value of combined oil and gas export earnings can be maintained, the equation must take into account not only the anticipated rate of decline in hard currency oil export revenue and the growth in the value of gas exports to the west, but also the expansion of imports for the natural gas sector necessary to meet planned production targets.

C. Gas Export Prospects in the 1980s: Implications for the Soviet Balance of Trade with the West

In projecting the supply of natural gas to western Europe, a critical determinant is the export capacity of the pipeline network. This includes, in addition to the Soviet network, the Czechoslovak system, as all Soviet gas piped to West European countries (excluding Finland) passes through Czechoslovakia.

The Eleventh Soviet Five-Year Plan (1981-85) gives priority to the construction of major additions to the domestic gas-pipeline grid. These include the construction of six large-diameter (1,420 mm) pipelines to bring gas from the Urengoi fields to European Russia. Five of the lines will tie into the existing domestic distribution system [67]. The sixth, the so-called "export" pipeline, is being built in cooperation with West European importing countries under an agreement which is the subject of section D below.

While negotiated in the form of a separate, gas-for-pipe-and-equipment arrangement, the export pipeline is in fact nothing more than a major component of the broader pipeline construction program which itself has important export and import implications. Because of the interlocking nature of the Soviet pipeline grid, the increase in export capacity at the Western border of the Soviet Union will not be limited to the capacity of this one line. It will in fact be far greater, by 1986, if pipeline construction plans proceed as scheduled. Moreover, imports of pipe and equipment from the West are not destined exclusively for the export

line, but will be combined with domestic materials and equipment more generally in the pipeline construction program.

If planned additions to the Soviet pipeline grid will provide more than sufficient capacity for the contemplated expansion of exports to Western Europe, what of the transit capacity through Czechoslovakia? Will it be a bottleneck? Since this aspect has been relatively neglected, let us examine the existing and projected capacity of the Czechoslovak "Transit" system in greater detail.

The border point for gas transhipment is Uzhgorod, where gas enters the Czechoslovak system. Soviet gas entering this system can be sourced, through the Soviet domestic pipeline grid, from the Western Ukraine (Dashava and Shebelinka fields), the Orenburg gas fields in the Urals, or from Western Siberia (Vuktyl, Medvezh'ye and Tyumen' fields). From Uzhgorod, Soviet gas is delivered through Czechoslovakia to six other countries - Austria, the FRG, France, Italy, the GDR and Yugoslavia.

There are three major "international" lines in the Czech gas transit network. The first, completed in 1967, is the "Bratstvo" pipeline, with a limited capacity of 4 bcm per annum. The first Soviet gas exports to Western Europe (Austria) passed through this line. Construction of a second "Bratstvo" network was initiated in 1970. It consists of two parallel lines, built in two stages between 1970 and 1975. The total rated capacity of the two lines is 28 bcm per annum [68]. Soviet gas could then be exported to the FRG, Italy and the GDR.

In 1975, Czecnoslovakia and the Soviet Union signed an agreement

whereby Czechoslovakia agreed to expand the overall capacity of its Transit system to 37 bcm [69]. This was necessary to accommodate the increased volume of natural gas to be delivered to both Czechoslovakia and the GDR (and possibly Hungary) under the Orenburg agreement. In the latter part of 1978, Yugoslavia was also linked to the Transit system, and in 1980, as the result of the extension of the pipeline leading from Czechoslovakia through the FRG, France was added to the list of countries served. In 1980, the six countries receiving Soviet gas via Czechoslovakia reported imports of about 32 bcm.

In 1978, Czechoslovakia began construction on the third pipeline in its Transit system, called the "Consortium" line [70]. It was originally intended to handle expanded deliveries to Austria, the FRG and France, envisaged under the 1975 agreement involving Iran, the Soviet Union and a west European gas consortium headed by Ruhrgas AG (FRG) [71]. (As mentioned earlier, this agreement has since been cancelled by the Islamic regime in Iran). By 1984, when the Consortium line is scheduled for completion, the capacity of the entire transit network will be 50-53 bcm per annum [72].

For its part, the Soviet Union already (in early 1983) has in place enough pipeline capacity to deliver this much gas. The Soyuz (Orenburg) pipeline has a capacity of 28 bcm at Užhgorod, and the "export line" of the Northern Lights system has a similar capacity [73]. A smaller pipeline from the Western Ukraine (Dashava) to Uzhgorod could handle an additional 4 bcm.

Soviet gas exports to Western Europe are limited, first and

foremost, by the capacity of the Transit system. There could be partial capacity through the "Consortium" line in 1983, but plans are for it to reach full capacity only in 1984.

On this basis we can project, from the supply side, the total possible volume of Soviet gas exports to Western Europe through the mid-1980s. After subtracting the projected, 1984 gas exports to the GDR (7 bcm) and Yugoslavia (3 bcm) which must be delivered via Czechoslovakia, and account is taken of the loss of gas during transmission (the compressor stations are fuelled by natural gas), total Soviet gas exports to Western Europe will not be able to increase beyond 40 bcm by 1984. The source of these gas exports could be the Western Ukraine, Orenburg or West Siberia.

The largest jump in Soviet gas exports to Western Europe should occur sometime in the next five-year-plan period (1986-90), with the completion of the planned additions to the Soviet domestic pipeline grid and the Czechoslovak extension of the Soviet export pipeline. This extension, which apparently remained on the design boards in 1982, would be the first large-diameter (1,420 mm) section of the Transit system [74]. Assuming that the gas is pumped through at the same pressure of 75 atmospheres planned for the export pipeline, the rated annual capacity would be 30-32 bcm [75].

Another transit link from Uzhgorod to the West has been mentioned --through Hungary [76]. This line would more directly serve importers of Soviet gas in Southern Europe. Little information has been made public on this aspect of the otherwise much publicized Soviet-West European export deal, and the route presumably remains

dependent on the level of Italian demand for Soviet gas.

Estimates of the supply capacity of the system being developed to deliver Soviet natural gas to western Europe in the second half of the decade, thus confront many unknowns and uncertainties on the Eastern side. (Uncertainties generated from the Western side, in particular the efforts of the United States to block construction of the export pipeline, will be discussed in the next section). Nevertheless, our estimate of the maximum possible volume of Soviet gas which could reasonably be delivered to Western Europe in late 1980s would be in the neighbourhood of 70 bcm almost three times the 1980 volume of exports.

In sum, then, supply constraints on the expansion of Soviet exports of natural gas to Western Europe are very modest, in marked contrast to the Soviet oil export situation. Moreover, they are rooted not in limits on the growth of production, but rather are imposed by the rate of expansion of transport facilities (pipeline capacity). As in the case of oil, however, Soviet gas exports to Western Europe have, in the early 1980s, begun to encounter limitations on the demand side. It is these which now (early 1983) seem likely to hold actual exports below their supply potential.

According to gas supply contracts under recent negotiation, it would appear that West European buyers are fixing delivery levels below previously anticipated volumes, reflecting the lower, projected demand for natural gas by the West European economies. For example, under the new agreement concluded in 1981, the FRG

will import 10.5 bcm and not the 12 bcm originally anticipated. The volume of Soviet gas exports to Western Europe would probably, therefore, remain below maximum pipeline capacity. Estimates for the volume of Soviet gas exports to Western Europe based on both supply and demand considerations are presented in Table 8. They show exports rising to a likely maximum of 55-60 bcm by 1988, and remaining in that vicinity for the remainder of the decade.

Whatever the volume of exports, it is the value of those exports which is especially important for the Soviet Union. It is much more speculative to calculate the value of those exports than it is the volume. Nevertheless, we have made some calculations on the estimated value of these exports over the current decade.

Table 8

Projected Volume and Value of Soviet Natural Gas Exports to Western Europe [a] (1980-1990)

Year	Volume [b] (bcm) supply constrained	Volume [b] (bcm) demand	Estimated value (billion of rubles) [c] Scenario 1	Estimated value (billion of rubles) [c] Scenario 2
1980	30	25	1.8	1.8
1981	30	26	2.8	2.8
1982	30	27	3.3	3.3
1983	35	30-32	3.7-3.9	4.1-4.3
1984	43	37-40	4.5-4.9	5.5-6.0
1985	56	50-55	6.2-6.8	8.2-9.0
1986	56	50-55	6.2-6.8	9.0-9.9
1987	56	50-55	6.2-6.8	9.9-10.9
1988	68	55-60	6.8-7.4	12.0-13.1
1989	68	55-60	6.8-7.4	13.2-14.4
1990	68	55-60	6.8-7.4	14.5-15.8

a - Excluding Finland.

b - The supply constraint on Soviet gas exports to Western Europe results from the capacity limits of the Czechoslovak gas transit system. From total capacity must be subtracted the 10 bcm of Soviet natural gas exports to the GDR and Yugoslavia as these are delivered through the Czechoslovak system as well. In 1983-84, the third pipeline in this system (called "Consortium") is to be brought on stream raising transit capacity to Western Europe to approximately 43 bcm per year. The fourth pipeline in the Transit system which utilizes for the first time 1420-mm diametre pipe, is to be partially completed in 1985, putting the capacity of the entire system at an estimated 56 bcm. When all compressors on this fourth line are completed (planned for 1988), total Transit capacity will reach about 68 bcm. The demand constraint is an estimate of the amount of gas West European countries will import based upon the 1981-82 contracts for increased gas deliveries. The supply constraint may come into play during the mid-1980s (1986-87), but for the most part, the level of Soviet gas delive- will be determined by West European demand.

c - We have calculated the estimated value as follows: The 1980-81 value figures are official Soviet statistics from Vneshniaia Torgovlia. The estimated 1982 value assumes a 10 percent increase in the price of Soviet gas deliveries to Western Europe. The estimated 1982 price for 1000 cu.m. of Soviet gas is about 123 rubles, which is also close to the reported "guaranteed minimum price" for new deliveries under the 1981-82 agreements (US $4,70 million BTUs). Using the 1982 price as a base, we then use two variants in price changes for the remainder of the decade. Scenario 1 assumes no significant further price increase for contracted deliveries, while Scenario 2 assumes a 10 percent annual increase in price.

From these calculations we see that 1985 hard currency gas export revenue would, depending upon the price assumption, be in the range of 6.2 to 9.0 billion rubles, an increase of 2.9 to 5.7 billion rubles over 1982 earnings. There has been much speculation as to whether or not these increased earnings will be adequate to offset a projected decline in Soviet hard currency earnings from oil exports. Given the recent, announced reductions in the spot and contract price of Soviet crude oil exports to non-CMEA markets, to between $27 and $28/bbl, it seems clear that the Soviet Union's hard currency revenue from oil exports will decline. The USSR cannot entirely (or for long) offset falling prices by increases in the volume of oil exports. In fact, the likehood is that the volume of Soviet oil exports to hard currency markets will continue a longer-term decline.

If we assume that the current price of Soviet oil exports to the West remains the same, and that the volume of these deliveries falls by about 10 mmt between 1981 and 1985, then the USSR will be earning about 3.3 billion rubles less from these exports in 1985 than in 1981. Thus, if oil and gas prices do not increase significantly between now and 1985, it is possible that combined oil and gas hard-currency revenue would fall below 1981 earnings. In real, rather than nominal, terms the decrease would be considerable. The real contribution of energy exports to the Soviet balance of trade with the West seems likely to be substantially diminisned by 1985.

The situation is in fact even more serious than implied by this projected decline in combined oil and gas export revenues. Much of the gas revenue is still required for the purchase of pipes, compressors

and field equipment for the natural gas industry. Soviet plans for gas pipeline construction over the 1981-85 period are staggering - 50,000 km. of pipeline and 360 compressor stations with an overall capacity of 25,000 MW. [77]. Five major domestic gas pipelines are to be built from the Tyumen' gas region to the European USSR. As these pipelines have been designated for 1,420 mm. diametre pipe at 75 atm., it is assumed that much of the required pipe must be imported. The gas export pipeline is, therefore, absolutely essential to finance the ambitious and costly plans for the Soviet gas industry. A substantial share of future gas export revenue will, as before, be earmarked to repay the import requirements of the natural gas industry, for many years to come.

In these circumstances, the Soviet Union will undoubtedly continue to pursue the strategy of widespread gas-for-oil substitution. Development plans for the gas industry indicate that this is likely to remain an integral part of Soviet energy policy. Current gas pipeline expansion has a dual aim in terms of hard currency earnings: direct export of gas to hard currency markets and domestic gas-for-oil substitution to release oil for export. Gas-pipeline development remains critical to the Soviet Union's internal fuels-energy balance and to its external balance of trade.

D. The Soviet-West European Natural Gas Pipeline Project [78]

1. Short History of the Negotiations

Beginning in 1978, exploratory talks were held between Soviet officials and West German business interests on the feasibility of building a pipeline from the large gas fields on the Yamal peninsula in the northernmost portions of the West Siberian wastelands to Western Europe. With the demise in 1979 of the trilateral German-Soviet-Iranian gas supply agreement, an alternative source of supply was more actively sought by the FRG. In early July 1980, the Soviet Union officially confirmed its interest to a high-level delegation headed by Chancellor Schmidt, which was in Moscow for the signing of a long-term German-Soviet economic and industrial cooperation agreement. The formal go-ahead for the project was given by including in the agreement a decision to begin negotiations.

Talks began in late July 1980 between the West German gas utility company Ruhrgas AG and a visiting Soviet delegation headed by the Soviet Deputy Foreign Trade Minister, Nikolai Ossipov. The questions discussed included the supply to certain West European countries of an additional 60 to 70 billion cubic meters of gas per year through a new, 4,450 km, dual-track, large-diameter export pipeline from Northwestern Siberia to Uzhgorod on the Western border of the USSR, and matters related to the financing and deliveries of pipe and equipment for the project [79]. (As the project materialized, the source of the gas shifted from fields on the Yamal Peninsula, also in north-

west Siberia to the more accessible Urengoi field.). The Soviet delegation subsequently visited other potentially interested parties in in Rome, Paris and Vienna. The negotiations progressed favourably throughout the year and a second round of meetings was held in October.

As they progressed, the negotiations were complicated by the fact that they were being conducted simultaneously with a variety of countries, all eager to see their purchases of gas occasion large supply contracts for domestic industries. The USSR understandably chose to to deal separately with suppliers and bankers in the West, in order to take maximum advantage of the conditions of the Western recession. This allowed Soviet negotiators to play one supplier against another, and to obtain low, nominal interest rates on the credits raised [80]. The major West European party -- in terms of gas purchases and pipe and equipment supplies -- remained the FRG, with Ruhrgas the lead member of the West German gas-purchasing consortium.

For the deal, the Soviet Union once again employed the time-tested compensation format. It sought to assure markets for increased gas exports to Western Europe and to arrange favourable financing for the import of the materials and equipment needed, through a linking of the two sets of operations. Several characteristics of the arrangement, however, distinguisn it from earlier Soviet export-pipeline projects (such as Northern Lights and Soyuz). First, the USSR has contracted a consortium of two leading national steel producers, Mannesmann (FRG) and Creusot Loire (France), to act as general contractors, whereas in previous projects, a Soviet enterprise was designated for the purpose [81]. The Soviet Union has, however, selected beforehand (or is selec-

ting concurrently) many of the Western suppliers. The second new characteristic is that almost all of the capacity of the new pipeline seems to be earmarked for export to Western Europe. Transit fees in kind paid to Czechoslovakia (and possibly eventually to Hungary) will presumably be made through existing pipelines.

In early 1981, a variety of difficulties surfaced on the European scene, which served to dampen optimism over the possibility of a quick conclusion of the negotiations. An unforeseen increase in West German interest rates over the latter months of 1980 complicated the talks, as the Soviets asked for terms below those the West German banks were now willing to offer. The newly-elected administration in the United States, strongly opposed to the project on strategic grounds, requested the Europeans to reconsider their plans to rely more heavily on Soviet gas, at a time when they were already experiencing unanticipated temporary reductions in contractual deliveries of gas from the USSR. While these disruptions were attributed to technical problems along the pipeline, caused by a particularly severe cold snap in Siberia, they nevertheless put into question the reliability of the Soviet Union as a supplier. Meanwhile, the West European market for gas had softened as the second oil price shock pushed the importing economies deeper into recession and as fuels conservation measures began to have effect.

These factors brought the Europeans to envisage a reduction in the volume of gas they were willing to purchase, from 60 to 70 bcm to 30 bcm or less per year. In France for example, the government undertook a serious review of the level of French participation in the project,

urging Gaz de France to lower the amount of gas it wished to import, from 10 bcm per year to 8 bcm [82]. To reflect the lesser, projected European demand for gas, Soviet pipeline building plans were scaled down at this time. They now called for the laying of only one pipeline instead of the original dual-track system, and which, operating at a pressure of 75 atm, would have a delivery capacity of around 30-32 bcm per year.

It is on this basis that the negotiations continued. As of end-1982, four West European countries (Austria, the FRG, France and Switzerland) had contracted for additional imports of Soviet gas totalling 20 bcm annually, while negotiations with one other country (Italy) for an additional 8 bcm per year were still underway (see Table 9).

The terms of financing to be provided by the Germans, and the prices to be paid for Soviet gas, remained the major obstacles throughout the first half of 1981. The stalemate over financing was finally broken in July, when an outline financing agreement was signed between Germany, the principal partner in the project, and the Soviet Union. The size of the officially-backed credit line was now half of what was originally anticipated, and covered only supplies of compressor stations and related equipment, not of pipe. Imports of large-diameter pipe are to be contracted for, and financed separately, on an annual basis /83/. Nominal interest rates were a concessionary 7.8 percent over ten years, well below market rates, but they were thought to be offset by higher purchase prices for equipment.

The way was now cleared for the conclusion of a major contract between Moscow and Mannesmann/Creusot-Loire for 22 compressor stations worth $940 million. These and other equipment purchases are listed in Table 10. Altogether the USSR has negotiated over $6 billion in long-term credits for the project from the FRG, France and others.

The question of prices was finally overcome in November 1981, when the Soviet side abandoned demands that gas prices should be tied to world prices for crude oil. The pricing formula agreed upon is composed of a base price and of a guaranteed minimum price. The base price, reportedly now fixed at an initial $4.70 per million BTUs, is to be indexed to overall trends in the price of fuels, such as heating and fuel oil, which compete directly with natural gas on the West German market. As for the guaranteed minimum price demanded by the Soviet Union, Ruhrgas AG, as lead member of the gas purchasing consortium, was able to reduce it from an original $6.05 per million BTUs to a reported $5.70 per million BTUs. The base price is the one West Germans will actually pay, but should it turn out to be less than the guaranteed minimum price in 1988, the year full deliveries of gas from the USSR are to be achieved, then the latter price will apply. This is a possibility, should fuel prices in West Germany remain stable, or increase only slightly [84].

It should be stressed that the Soviet-West European pipeline project involves two distinct sets of contracts that are tied to one another only in broad compensation terms. One set governs the purchase of Soviet gas by individual West European countries, while the other is for purchases of pipelines and equipment by the Soviet Union

from Europe. The two contract packages are connected implicitly but not formally. Both sides recognize that increased deliveries of gas entail purchases of European equipment for the expansion of the Soviet gas transportation network, and that gas exports will generate the foreign currency revenues required to repay the loans through which the purchases were made.

B. American Attempts to Block the Export of Pipeline Technology to the USSR

The Reagan Administration in the United States strongly opposed the pipeline from the very beginning, and has resorted to political and economic pressures to stop it [85]. At the Ottawa Summit in July 1981, President Reagan personally expressed his grave concerns over the detrimental repercussions a greater European dependence on Soviet gas would have for the cohesion of the Western Alliance. He urged European heads of government to consider instead alternative energy supply sources located within the Alliance. The European countries declared these to be inadequate and proceeded with the negotiations.

Despite findings of a Congressional study issued in Fall of 1981 that the Soviet energy sector was not vulnerable to unilateral US sanctions, the Administration took a series of steps beginning in December 1981 to block the pipeline project [86]. These focussed on preventing the export of US technology important to the completion of the project (see Table 12). Ostensibly as a reaction to the imposition of martial law in Poland, the American government on December 29, 1981, imposed

sanctions on the export by American companies of oil and gas technology and equipment to the Soviet Union.

The sanctions prevented the Caterpillar Tractor Company from shipping 200 pipelayers to the USSR, and the General Electric Company, Dresser Industries and Cooper Industries from providing further turbine components to AEG-Telefunken of West Germany, John Brown & Company of the UK and Nuovo Pignone of Italy, all three responsible for the outfitting of the compressor stations along the pipeline. Not affected by these sanctions were 23 rotor and blade sets shipped to Europe by General Electric prior to the embargo.

The sanctions were further extended on June 19, 1982, to include equipment manufactured by the subsidiaries of American companies abroad, or produced by foreign firms under licence from U.S. companies Moreover, these were to apply retroactively. Affected were the above named companies which manufacture turbines under licence from General Electric, as well as: Alsthom-Atlantique of France, which has a General Electric licence to produce spare rotor and blade sets for turbines, Creusot-Loire Engineers of France, which has a licence from Cooper Industries to provide replacement parts for the compressor stations, and the French subsidiaries of Rockwell International and Dresser Industries.

Under American law any company found in violation of these restrictions would be subject to fines of five times the value of U.S. components involved, and prison terms of five years for the executives of violating companies entering the United States. Furthermore, infringement of the sanctions would cause foreign companies to be black-

listed by US authorities, to prevent them from obtaining American technology in the future [87].

The European governments reacted sharply to what they regarded as American encroachment on their sovereignty. The Italian government ordered Nuovo Pignone in late July 1982 to fulfill its contractual obligations to supply compressor stations, while the British and French governments ruled that their companies could legally ignore the American sanctions. In early August, British and French companies were instructed by their governments to meet their contracts, and the EEC prepared to challenge the legal validity of the US sanctions. For their part, European firms instituted legal proceeding in US courts against this American legislation.

Throughout September, the American government, faced with this intense European opposition to the sanctions, contemplated applying less severe penalties on companies in violation of the sanctions. In late September 1982, the US House of Representatives passed a bill asking for repeal of the restrictions. Finally, on the weekend of November 13-14 1982, the Reagan administration lifted the June sanctions on European firms exporting American oil and gas technology to the USSR. It accompanied this action with the announcement that the European governments had in return agreed to cooperate with the US in tightening general rules governing provision of technology and credits to the USSR. The French government denied the existence of such a deal.

In early 1983, European deliveries for the pipeline were moving ahead, but direct American involvement remained blocked. It the end, the US action had not delayed completion of the pipeline to any significant

degree [88].

Table 9

Contracted Soviet Deliveries of Natural Gas to Western European Countries, as of end-1982

Definite Buyers

West Germany	-	10.5 bcm per year over 25 years to Ruhrgas AG. Partial deliveries to begin in 1984. Ruhrgas AG will supply Switzerland with 360 million cm per year beginning 1988 out of the 10.5 bcm. This figure reportedly includes deliveries of 700 million cm to West Berlin.
France	-	8 bcm per year over 25 years to Gaz de France.
Austria	-	1.5 bcm per year over 25 years to OMV AG. Has option to purchase further 1 bcm per year.
Switzerland	-	360 million cm per year over 20 years to Swissgas SA. To be supplied by West Germany's Ruhrgas AG.
Total	-	20 bcm per year.

Other Buyers*

Italy	-	8 bcm per year to Snam. Contract was signed in January 1982, but political debate has delayed ratification by the Italian government. Italy was said to be ready to resume negotiations over Soviet gas deliveries in March 1983.
Total	-	8 bcm

* - The Netherlands, Belgium and Spain were initially interested in receiving up to 9 bcm per year from the pipeline (5 bcm for Belgium, and 2 bcm per year each for Netherlands and Spain). Reduced demand for gas in Holland and Belgium, caused by the economic recession, and the fact that the Soviet Union did not place large orders for equipment for the pipeline with companies in these countries, has meant that there is no longer any immediate interest to buy gas from the USSR. Furthermore, Belgium and Spain will now be supplied with gas imported from Algeria to meet their requirements.

Table 10

Western Equipment Contribution to Soviet-West European Gas Pipeline ,as of end-1982

Country	Approximate Value of Contracts	Type of Equipment	Companies
West Germany	$1.2 billion	Large-diameter pipelines; compressor stations, turbines and accessories; truck cranes; general contracting and engineering services for project provided by Mannesmann/Creusot-Loire consortium	Mannesmann; AEG-Kanis / Salzgitter; Demag; Liebherr
France	$664 million	Large-diameter pipelines; compressors; computerized equipment; turbine rotors; gas filters and other equipment; general contracting and engineering services for project provided by Mannesmann/Creusot-Loire consortium	Creusot-Loire; Vallourec; Thomson-CSF; Stein-Heurtey; Alsthom-Atlantique
Italy	$890 million	Large-diameter pipelines; steel plates; compressor stations and turbines	Nuovo Pignone; Finsider
United Kingdom	$260 million	Turbines and other equipment; information systems and computer terminals; firefighting and gas detecting equipment; gas conditioning equipment	John Brown Engineering; Rediffusion Computers; Walter Kidde Co.; Plenty
Austria	n.a.	Large-diameter pipelines	Voest-Alpine

Finland	$90 million	Building enclosures for compressor stations; radio-telephone equipment	Metex Corp.; Nokia Electronics
Japan	$190 million	pipelayers; excavators	Komatsu; Kato

Other Countries with Lesser Interest

Switzerland	n.a.	Milling machines to produce turbine blades	Starrfrasmaschinen AG.

Table 11

Financing Arrangements for Western Deliveries to the Soviet-West European Pipeline Project, as of end-1982 [89]

West Germany
- $1.12 billion credit agreement to finance equipment contracts, for an 8-year period at 7.8 percent, offered by a banking consortium led by Deutsche Bank. Guaranteed by the German government's Hermes Credit Insurance Co.
- Additional credits at market rates to be negotiated on a yearly basis.

France
- $3.5 billion credit at 7.85 percent on 85 percent of total loan, offered by Credit Lyonnais, Banque de Paris et des Pays Bas and Banque de l'Union Europeenne, backed by government.
- $340 million at market rates payable over 8 years beginning 1985, with no government guarantees, offered by above banks.

Italy
- $500 million credit.

Sweden
- $190 million credit to finance purchases of industrial equipment and services related to the pipeline, offered by Svenska Handelsbank and Skandinavska Enskilda.

Other
- $280 million over 7 years lent to Vneshtorgbank for purchases of Finsider (Italy) steel products destined for the pipeline, by UK-based banking consortium led by Morgan Grenfell.
- $80 million credit at a 0.625 percent over Libor to finance purchase of Italian steel products destined for the pipeline by UK-based banking consortium led by LLoyd's.

n.b.
- A consortium of Dutch banks led by Amsterdam-Rotterdam Bank and Algemene Bank Nederland offered a credit line of over $1 billion for the project. As the Soviets did not use this credit, the Dutch offer lapsed in March 1982.
- Japan has also extended sizeable credits to the USSR for the purchase of wide-diametre pipes. Some of the credit may be applied to the purchase of pipes destined for the Soviet-West European pipeline as well as for other projects in the Soviet pipeline development program.

Table 12

Potential US Technological Contribution to the Project, Direct and Indirect

Caterpillar Tractor Company	-	Pipelayers (directly supplied)
Dresser Industries	-	Turbine components; French subsidiary manufactures compressors
Cooper Industries	-	Turbine components; French firm has licence to manufacture replacement parts for compressor stations
General Electric	-	Rotors and blades for the turbines; turbines for the compressors are of General Electric design, manufactured under licence by European firms
PUK	-	Cobalt alloy technology for the manufacture of rotor blades, licenced to French firm
Rockwell International	-	Valves and gauges for compressor stations (supplies French subsidiary)

PART V. A CHANGING BALANCE OF DEPENDENCE

In the preceding pages we have traced the deteriorating position of oil and the rising importance of gas in Soviet energy exports to western Europe. What then are the implications of the long-term substitution of gas for oil in Soviet exports, for the balance of energy and energy-related dependence in Soviet-West European relations? We shall conclude with a few thoughts on this difficult and controversial question.

We have seen that the Soviet share of West European oil imports was marginal -- never exceeding seven percent for Western Europe as a whole. For those countries whose import dependence on Soviet oil was considerably greater than this average, the absolute amounts were not so large as to make it difficult to find substitute supplies on world markets. In sum, west European dependence on imports of Soviet oil has never been great and is likely to decline, with what appears to be a long term downward trend in the volume of Soviet oil exports to the West.

Soviet dependence on oil exports to the West was, on the other hand, very considerable. The value of oil and oil products in the total value of Soviet exports to the industrial West (excluding Finland) had risen to 56 percent by 1981. Moreover, oil exports have served not only as a major source of hard-currency revenues, but as a general purpose source. Oil export revenues have supported, among others, Soviet imports of western equipment and technology for a wide range of purpose.

In these circumstances, the question of West European dependence on Soviet energy supplies was not a critical policy issue for Western governments. The policy context was radically altered, however, with the 1981-1982 agreements to raise the volume of West European imports of Soviet gas by two to three times the 1980 level before the end of the decade. The projected increase will significantly raise West European import dependence on Soviet gas over the course of the 1980s. Estimates indicate that by 1990 the USSR will meet some 32 percent of the import needs of OECD-Europe [90]. For several major West European countries, this share will be considerably higher, reaching a projected 100 percent for Austria, 25 percent for France, 30 percent for the FRG and 35 percent for Italy. The spectre was therefore raised of significant potential Soviet leverage in the West European 'market' for gas, leverage which could be employed for political as well as economic purposes [91].

West Europeans have argued that this import dependence on Soviet gas is not excessive in terms of their overall energy consumption; that it is offset by declining dependence on Soviet oil; that arrangements for emergency substitution from other sources are being made, and that there is, in any case, no practical alternative [92]. It is inescapable, however, that West European import dependence on Soviet gas will be greater than it ever was on Soviet oil, if present plans are carried out. This relationship is reinforced by the long-term, contractual nature of the gas import arrangements, within the framework of compensation agreements on which repayment of West European credits are dependent. Moreover, the magnitude of imports and especially the

nature of the gas supply system would make it impossible readily to substitute gas from other sources for Soviet gas in the short run, as was the case with oil. There is no Rotterdam spot market to call upon. The projected decline in oil imports from the USSR therefore cannot compensate for the increase in import dependence on Soviet gas.

On the other hand, we have seen that expected gas export earnings cannot play a role in the Soviet hard-currency balance of payments equivalent to that of oil. In this sense there will be a marked loss in the import-financing capacity of energy exports with the shift in structure from oil to gas. It is highly unlikely that the projected rise in gas earnings over the 1980s can fully offset the anticipated fall in oil revenues. More certainly, and no less importantly, gas earnings cannot play the general purpose role of oil revenues in the Soviet balance of payments with the West. They will remain substantially tied to purchases on credit of material and equipment for the development of the production and distribution capacity of the Soviet gas sector.

In the circumstances, gas exports cannot be easily turned on and off, as were oil exports, to meet current hard-currency revenue targets - much less for other foreign policy purposes. As the overall role of energy exports in the Soviet balance of payments with the West diminishes, the USSR will need every unit of convertible currency it can derive from gas exports. Gas exports, we conclude, cannot for the foreseeable future provide the Soviet Union with a flexible tool of linkage diplomacy to employ in its relations with Western Europe.

FOOTNOTES

1. While there is no detailed history of the Russian-Soviet oil industry available in English, the outlines of its development are presented in standard works on the industry, such as: Campbell (1968) and Goldman (1980).

2. Including Belgium, Denmark, England, France, Germany, Italy, the Netherlands, Sweden and Spain.

3. Hartshorn (1967), p. 234.

4. Sutton, Volume 1 (1968), p. 42.

5. Hartshorn (1967), p.234.

6. Ibid., p.235.

7. For example, a U.S. Department of State document published in 1961 concluded: "Foreign economic policy in the case of bloc countries is an adjunct and tool of over-all foreign policy, and as such it is determined primarily by political considerations. For this reason, economic policy must be viewed against the broader background of foreign policy and the attempt to enhance total communist power relative to that of the U.S. and its allies". The Sino-Soviet Economic Offensive Through 1960, Intelligence Report No.8426, March 21, 1961, p.1. The U.S. oil industry charged that, "The Soviet Union is not out simply to sell oil, but to disrupt, undermine and, if possible, destroy the position of the private oil industry". National Petroleum Council, Impact of Oil Exports from the Soviet Bloc, (Washington, D.C.,1962), p.38. Both quotations are cited in Spencer (1966), p.94.

8. Adelman (1972), p.201; Spencer (1966), p.103; Hartshorn (1967) p.236.

9. See Table 1

10. In the years 1952-54, the cumulative trade deficit with the developed capitalist countries was 115 million rubles; see Table 1.

11. Calculated on the basis of figures for "liquid fuel consumption" in United Nations, World Energy Supplies.

12. Adelman (1972), p.201.

13. In a detailed study of Soviet behaviour in Western export markets, Wolf concluded that more often than not the Soviet Union is a "price follower", even in markets where it has potential market

power. See T.Wolf, "Soviet Market Power and Pricing Behaviour in Western Export Markets", Soviet Studies, XXXIV, 4 (October 1982), pp. 529-546.

14. Petroleum Press Service, May 1972, p.162.

15. This possibility was mentioned by Abraham S. Becker, in "Oil and the Persian Gulf in Soviet Policy in the 1970s", in M.Cofino and S. Shamir (eds), The USSR and the Middle East, (New York: John Wiley and Sons), 1973.

16. There is some evidence that at this time the USSR was encouraging its East European allies to curtail their growing reliance on Soviet oil by increasing their imports from the Middle East. See: Hannigan and McMillan (1981a), p.20.

17. Subsequent to the Teheran and Tripoli agreements on February and March, 1971, the average world price of crude oil increased substantially. In specific cases, posted prices for Middle Eastern crude rose by more than 30 percent. See: T.Rifai, The Pricing of Crude: Economic and Strategic Guidelines for an International Energy Policy, New York: Praeger, 1974, chapter 16.

18. For a more detailed account of Soviet oil exports and the balance of trade after 1972, see Goldman (1980), pp.92-98.

19. The industrial strategy and other policy motivation underlying the expansion of Soviet economic relations with the West at this time have been subject to extensive analysis. See, for example, J. Brougher, "USSR Foreign Trade: A Greater Role for Trade with the west", and P. Hanson, "International Technology Transfer From the west to the USSR", both in Soviet Economy in a New Perspective, A Compendium of Papers submitted to the Joint Economic Committee, Congress of the United States, Washington D.C.: Government Printing Office, 1976. Rising grain imports reflected the Soviet decision to develop production of meat and dairy product and therefore to offset bad harvests through imports rather than by slaughtering livestock.

20. In 1975, the Soviet Oil Minister expressed publicly his concern over the falling reserves-to-production ratio. See Petroleum Economist, March 1975, p.86, and June 1976, p.205. Soviet publications appearing in 1977 concluded that the USSR's future oil production potential was much less optimistic than had been previously thought. For a concise review of the Soviet literature on this subject, see Meyerhoff (1980), pp. 111-118.

21. West Siberian oil production was scheduled to rise from 143 mmt in 1975 to 305 mm in 1980, an average annual rate of growth of 16 percent. From data in Dienes and Shabad (1979), p.47.

22. CIA (1977a), (1977b).

23. Targets for oil production in the current (1981-85) plan period show that oil production is scheduled to rise at a low annual rate of between 0.6 and 1.4 percent.

24. The estimate is from J.P.Riva,Jr., "Soviet Petroleum Prospects: A Western Geologists View", in Joint Economic Committee, Congress of the United States, Energy in Soviet Policy, (Washington, D.C.: GPO), 1981.

25. The 1980 Soviet foreign trade yearbook shows a surplus with those countries making up the category "developed capitalist countries". Consequently, there are numerous reports of a 1980 Soviet surplus in hard currency trade. When Soviet-Finnish trade is substracted however, the balance shows a very moderate (18 million ruble) deficit. We think this is a better reflection of Soviet hard currency trade.

26. N. Baybakov, "The Five-Year Plan in Action", Planovoe Khoziaistvo, No.1, 1982, pp.3-15.

27. See Bergson (1981).

28. Hannigan and McMillan (1981a), p.32.

29. This goal set forth in a resolution of the Central Committee of the Communist Party of the Soviet Union in May 1981, entitled "On the Basic Guidelines and Measures for Raising the Effectiveness in the Use of Fuel-Energy Resources in the Economy during 1981-85 and in the Period up to 1990". The resolution also stated that fuel consumption in 1990 was to be 180-190 mmt less than in 1985. (Ekonomicheskaia Gazeta, No.21, May 1981, p.3). Total fuel consumption (measured in standard fuel equivalents) was 1,629 mmt in 1979, according to official Soviet statistics in Narodnoe Khoziaistvo SSSR v 1979 g., p.57.

30. The data for the 1970s are derived from Western foreign trade statistics as the Soviet Union had by then ceased giving separate volume figures for crude and product exports.

31. This condition depends upon the price relationship between oil products and crude, but generally speaking, the value added in the refining process would give the Soviet Union additional hard currency proceeds. See Campbell (1976), p.79.

32. Oil and Gas Journal, November 22, 1976, p.67.

33. Petroleum Economist, September 1977, p.351.

34. Petroleum Intelligence Weekly, December 3, 1979, p.2.

35. Under the agreement, Rhone-Poulenc will supply the USSR with chemical plants and assorted chemicals, in return for a mix of crude oil and oil products, among other products. Financial Times of London, December 15, 1980, p.3; and The Economist, December 20, 1980, p.69.

36. Estimates were based on the targeted annual growth of 0.6-1.4 percent for petroleum production and 3.4-3.7 percent for national income, in 1981-85. On the basis of 1976-80 performance, it was assumed that the growth of petroleum consumption would not be reduced below the rate of growth of national income. Annual deliveries to the Comecon countries were assumed to be maintained as announced, at their 1980 level. For more details, see Hannigan and McMillan (1981b), Appendix.

37. One often overlooked possibility is that the Soviet Union could draw upon whatever oil stocks it has to raise exports to Western Europe. The size of their inventory at year-end 1980, is, however, unknown.

38. Financial Times of London, March 10, 1981, p.1.

39. East-West Trade Council Newsletter, February 17, 1981, p.5, citing Petroleum Intelligence Weekly of February 2, 1981.

40. Globe and Mail, (Toronto), July 8, 1981, p. B23.

41. Petroleum Intelligence Weekly, January 25, 1982 and Globe and Mail (Toronto), April 16, 1983, p.B1.

42. The Economist, April 16, 1983, p.73.

43. Detailed studies of the Soviet gas industry over the past two decades include Campbell (1968), Orudzhev (1976), CIA (1978), Dienes and Shabad (1979), and Stern (1980).

44. Based upon data from United Nations, World Energy Supplies 1950-1974, New York: United Nations, 1976.

45. The rationale lying behind these imports, and a general analysis of the two arrangements can be found in Hannigan and McMillan (1982).

46. The Bratstvo system was inaugurated in 1967, and delivered gas to Poland and Czechoslovakia, as well as to Austria.

47. The GDR also began to receive Soviet gas through the expanded Bratstvo system in 1973.

48. Oil and Gas Journal, August 14, 1972, p.59.

49. For a case study of the Orenburg natural gas project see Hannigan (1980).

50. Dienes and Shabad (1979), pp.70-71.

51. See Stern (1981).

52. Czechoslovakia also expanded its gas transit system to accommodate the growth in gas exports to Western Europe.

53. It may be recalled that Urengoi was also the field meant to source the North Star LNG project, the aborted US-Soviet plan to export LNG from Murmansk to the Atlantic Seaboard of the United States. For an extensive case study see, J.T. Kosnik, Natural Gas Imports from the Soviet Union: Financing the North Star Joint Venture Project, New York: Praeger, 1975.

54. Dienes and Shabad (1979), p.91, citing Pravda and Ekonomicheskaia Gazeta.

55. Further details of the arrangement, and an analysis of individual country motivation for entering such a deal are presented in Hannigan and McMillan (1982).

56. See Campbell (1980a), Chapter 7, and Campbell (1980b).

57. Campbell (1980a), pp.212 passim.

58. Probst (1971), p.53.

59. The criteria for making the decision regarding domestic development or import are difficult to discern. As Campbell (1980b), p.24 says: "The more carefully I examine what is said in Soviet sources about this case the more I doubt that the USSR has any systematic way of making an explicit choice between domestic R&D and foreign technology".

60. Campbell (1980b), pp.9-12.

61. The compensation format is a preferred method of the USSR for doing business with Western companies. Although first employed in the natural gas sector, compensation deals in East-West trade have been extended to other sectors (chemicals, pulp and paper). Soviet literature on the subject is extensive, some of the sources being Voinov (1974), Sushkov (1977), Ponomaryov (1978), and Savin (1980).

62. Foreign Trade USSR, No.3, 1980, p.19.

63. This estimate is based on several press reports of the volume and value of pipe sales. Petroleum Press Service, June 1970, pp.207-8; Oil and Gas Journal, July 17, 1972, p.74; East-West Markets, November 4, 1974, p.4; Financial Times, September 15, 1977, p.7; Financial Times, June 15, 1979, p.21; Business and Trade, Vol.8, No.21, February 27, 1980, p.3; and Financial Times, April 4, 1981, p.3.

64. Calculated from Vneshniaia Torgovlia SSSR, various years, and using an average ruble-dollar exchange rate for each year.

65. This conclusion is also upheld by other western analysts. See Stern (1980), p.125, and his citation on p.99 from Z. Zeman and J. Zoubek, Comecon Oil and Gas within the Overall Energy Context, London: Financial Times Ltd., 1977.

66. Testimony of Deputy Director, Defense Intelligence Agency before the Subcommittee on International Trade, Finance and Security Economics of the Joint Economic Committee, US Congress, July 8, 1981.

67. The five domestic lines are Urengoi-Novopskov (3,570 km), Urengoi-Griazovets (1440 km), Urengoi-Petrovsk (2019 km), Urengoi-Centre (3,423 km), and the second Urengoi-Centre (3,384 km). Sotsialisticheskaia Industriia, April 14, 1982, p.2. Translated in JPRS No.81147. There have been several references to six domestic pipelines instead of five, but to the best of our knowledge the Soviet Union plans only five during the current Five-Year Plan period (1981-85).

68. Orudzhev (1976), p.128.

69. Ibid, p.128.

70. Czechoslovak Foreign Trade, No.9, 1979, p.26.

71. For details of this arrangement see Hannigan and McMillan (1982).

72. Czechoslovak Foreign Trade, Nos. 1-2, 1979; and East European Markets, Issue No.13, November 16, 1981, p.6.

73. Dienes and Shabad (1979), p.92.

74. L.Hrudka, "Construction of the Fourth Czechoslovak Pipeline Readied", Rude Pravo, (Prague), 29 October, 1982, p.1 and "Czechoslovakia - The Largest Transporter of Natural Gas", Czechoslovak Foreign Trade, No.11, 1982, pp.24-25. The planned completion date is 1983.

75. Financial Times of London, October 21, 1981, p.1, citing Mr. Yuri Baranovsky, Chairman of Soyuzgazexport.

76. Learned during conversation with Hungarian officials in Spring 1982.

77. Ekonomicheskaia Gazeta, No.13, (March), 1981, p.2. For comparison, the capacity of these compressors stations is greater than the entire nuclear power generating capacity in the USSR in 1980.

78. This section is based on numerous reports from the Western press, supplemented with some reports from the Soviet and East European press. In particular, the Financial Times, the Economist, Business Eastern Europe, Soviet Business and Trade and Foreign Trade (Moscow) were used as primary sources.

79. Sources differ as to the exact length of the pipeline. The figure cited here is for that portion of the line strung within the borders of the USSR, from the Urengoi fields to Uzhgorod. The figure is from S.Baigarov, "Kilometer after Kilometer", APN (Agence Press Novosti) Daily News (Moscow), 17 November, 1982, p.1. The Czechoslovak portion of the pipeline, from Uzhgorod to the West German border, is reported to be 860 km long: Lumir Hrudka, "Construction of the Fourth Czechoslovak Pipeline Readied", Rude Pravo (Prague), 29 October, 1982, p.1. The total length of the pipeline, from Western Siberia to West Germany, should therefore be about 5,300 km. However, Soviet purchases of wide-diameter pipe and of equipment are destined for the portion of the pipeline located within the borders of the USSR.

80. The USSR was originally seeking as much as $13 billion in Western credits, but this has been cut back to about $5 billion (to date). Numerous delays marked the course of negotiations on financial arrangements, primarily because of soaring prime rates in Western Europe in late 1980s and 1981.

81. The management fee is 6-7 percent of the total cost of the project.

82. Michel Herblay, "La Logique du Gaz", L'Expansion, No.187, 19 février - 4 mars 1982, p.89.

83. Soviet Business and Trade, Vol.X, Issue 5, August 21, 1981, p.1.

84. Wilfrid Prewo, "The Pipeline: White Elephant or Trojan Horse?", The Wall Street Journal, September 28, 1982, p.34. Also the Financial Times of London, November 20, 1981, p.14, and November 22, 1981, p.6.

85. The Carter Administration, in retaliation to the Soviet invasion of Afghanistan, had already sharply curtailed American exports of high technology to the USSR, while also imposing an embargo on shipment of grain, phosphates and goods destined for the 1980 Olympic games. With the support of Senator Henry Jackson, Zbigniew Brzezinski had pressed for a complete ban on American exports of high technology, while Carter chose instead to curtail exports of manufacturing technology and know-how. In the oil and gas sector, shipments of equipment, but not of manufacturing technology, were permitted, provided they were licensed. Business Week, July 28, 1980, pp. 54-59.

86. Office of Technology Assessment, "Technology and Soviet Energy Availability", Congress of the United States, Washington D.C., US GPO, November, 1981.

87. The Economist, August 7, 1982, p.55.

88. Statement E.A. Hewett submitted to the Subcommittee on International Economic Policy of the US Senate Committee on Foreign Relations hearings on US Export Controls and the Soviet/West European gas pipeline, July 30, 1982.

89. Figures indicated have been converted to US dollars using 1982 mid-year exchange rates.

90. International Energy Agency, Natural Gas to the Year 2000, Paris, 1982, pp.120-122.

91. G.Crovitz, "The Soviet Pipeline a Bad Idea Made Worse", The World Economy, vol.5, No.4, Dec.1982, pp.407-409, and W. Prewo, op.cit.

92. W.Müller (1981) and Deutches Institut für Wirtschaftsforschung, "Erdgas aus der Sowjetunion", Wochenbericht, No.14, 1981, pp.163-165.

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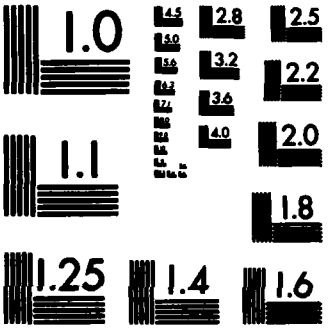

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Security Classification

DOCUMENT CONTROL DATA - R & D

(Security classification of title, body of abstract and indexing annotation must be entered when the overall document is classified)

1. ORIGINATING ACTIVITY
Department of National Defence
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2a. DOCUMENT SECURITY CLASSIFICATION
UNCLASSIFIED

2b. GROUP

3. DOCUMENT TITLE
The Soviet-West European Energy Relationship: Implications of the Shift from Oil to Gas

4. DESCRIPTIVE NOTES (Type of report and inclusive dates)

5. AUTHOR(S) (Last name, first name, middle initial)
HANNIGAN, J.B. and McMILLAN, C.H.

6. DOCUMENT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
June 1983	98	29

8a. PROJECT OR GRANT NO.	9a. ORIGINATOR'S DOCUMENT NUMBER(S)
96132	ORAE Extra-Mural Paper No. 24
8b. CONTRACT NO.	9b. OTHER DOCUMENT NO.(S) (Any other numbers that may be assigned this document)

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11. SUPPLEMENTARY NOTES	12. SPONSORING ACTIVITY

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This report analyzes, in historical perspective, Soviet oil and gas exports to Western Europe, and attempts to explain the underlying economic motivations for those exports. The increasing importance of oil and gas in total Soviet hard currency earnings is studied from the viewpoint of Soviet dependence on the energy markets of Western Europe. The report also offers projections up to 1990 on the volume and value of Soviet oil and gas exports to hard currency markets. These projections form the basis of a concluding analysis of the effect on the Soviet balance of payments of the shift from oil to gas in the structure of hard currency energy exports.

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